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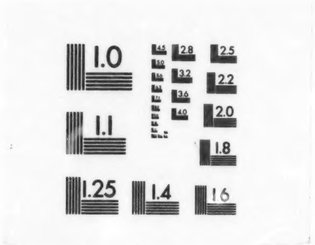

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G. B. Reed Groundfish Cruise No. 83-5, September 20-October 6, 1983

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March 1984

Canadian Data Report of Fisheries and Aquatic Sciences No. 445

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Canadian Data Report of Fisheries and Aquatic Sciences

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The correct citation appears above the abstract of each report.

Rapport statistique canadien des sciences halieutiques et aquatiques

Ces rapports servent de base à la compilation des données de classement et d'archives pour lesquelles il y a peu ou point d'analyse. Cette compilation aura d'ordinaire été préparée pour appuyer d'autres publications ou rapports. Les sujets des Rapports statistiques reflètent la vaste gamme des intérêts et politiques du Ministère des Pêches et des Océans, notamment gestion des pêches, techniques et développement, sciences océaniques et environnements aquatiques, au Canada.

Les numéros 1 à 25 de cette série ont été publiés à titre de Records statistiques, Service des pêches et de la mer. Les numéros 26-160 ont été publiés à titre de Rapports statistiques du Service des pêches et de la mer, Ministère des Pêches et de l'Environnement. Le nom de la série a été modifié à partir du numéro 161.

Le titre exact paraît au haut du résumé de chaque rapport.

Canadian Data Report of
Fisheries and Aquatic Sciences No. 445

March 1984

G.B. REED GROUNDFISH CRUISE NO. 83-5, SEPTEMBER 20-OCTOBER 6, 1983

by

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ABSTRACT

Westrheim, S. J., R. P. Foucher, and J. Cooper. 1984. G.B. REED Groundfish Cruise No. 83-5, September 20-October 6, 1983. Can. Data Rep. Fish. Aquat. Sci. 445: iv + 56 p.

During September-October, the R/V G.B. REED completed an echo-sounder survey in Queen Charlotte Sound and a trawl survey in Hecate Strait. The echo-sounder survey delineated "trawlable " and "untrawlable" bottom on Goose Island Bank. The trawl survey investigated the distribution and abundance of juvenile Pacific cod (Gadus macrocephalus). Hydrographic stations were occupied in Queen Charlotte Sound and Hecate Strait. Surficial sediments were sampled on Horseshoe and Dundas grounds in Hecate Strait. Technological studies on arrowtooth flounder (Atheresthes stomias) were completed.

Most of Goose Island Bank was deemed "untrawlable". Abundance (or availablity) of juvenile Pacific cod was low. Water temperatures from surface to bottom were abnormal.

Key words: Pacific cod, juvenile abundance, length frequency, hydrography, surficial sediments, bottom trawlability, Queen Charlotte Sound, Hecate Strait

RÉSUMÉ

Westrheim, S. J., R. P. Foucher, and J. Cooper. 1984. G.B. REED Groundfish Cruise No. 83-5, September 20-October 6, 1983. Can. Data Rep. Fish. Aquat. Sci. 445: iv + 56 p.

En septembre et octobre, le G.B. REED a réalisé un levé échographique dans le détroit Reine-Charlotte et un levé au chalut dans le détroit d'Hécate. Le premier avait pour but de délimiter les fonds «chalutables» et «non chalutables» du banc de l'Île Goose tandis que le second devait déterminer la répartition et l'abondance de la morue du Pacifique (Gadus macrocephalus) juvénile. Le navire a visité des stations hydrographiques situées dans les détroits Reine-Charlotte et d'Hécate; à ce dernier endroit, des sédiments superficiels ont été échantillonnés dans les pêcheries Horseshoe et Dundas. De plus, des études technologiques sur la plie à grande bouche (Atheresthes stomias) ont été menées.

On a jugé la plus grande partie du banc de l'Île Goose comme «non chalutable». L'abondance (ou la disponibilité) de la morue du Pacifique juvénile était faible tandis que les températures de l'eau de la surface au fond étaient anormales.

Mots clés: morue du Pacifique, abondance des juvéniles, fréquence de longueurs, hydrographie, sédiments superficiels, capacité de chalutage sur le fond, détroit Reine-Charlotte, détroit d'Hécate

INTRODUCTION

G.B. REED Groundfish Cruise No. 83-5 was conducted during September 20-October 6, 1983. The two principal purposes were: (1) complete the echo-sounder mapping of Goose Island Bank, in Queen Charlotte Sound, which was initiated in 1982 (Westrheim et al. 1982); and (2) investigate the distribution and abundance of juvenile Pacific cod (Gadus macrocephalus) in Hecate Strait. Other scheduled activities were technological studies on arrowtooth flounder (turbot) (Atheresthes stomias) and investigating the vertical temperature regime at selected hydrographic stations in Queen Charlotte Sound and Hecate Strait.

MATERIALS AND METHODS

Echo-sounder "mapping" of Goose Island Bank was undertaken with a SIMRAD EK-38 sounder. LORAN-C tracklines, at 20-microsecond intervals were run at 6 knots. The lines were oriented in a northwest-southeast direction to minimize ship roll due to wind and sea. Depths were recorded on the echogram at every "corner" of the grid and at 10-minute intervals along each transect. The bottom was assessed subjectively as "trawlable" or "untrawlable", to the vessel's Granton trawl (equipped with 18" bobbins) based on past experience. Outer bathymetric limit to Goose Island Bank was arbitrarily selected to be 80 fath, except for the eastern boundary--see Figure 2.

Distribution and abundance of juvenile Pacific cod was investigated primarily by trawling with the 78-ft (23.8-m) Gulf balloon shrimp trawl used for assessing abundance of juvenile flatfish in Hecate Strait (Fargo et al. 1983). The shrimp trawl was towed with the port main warp (1.2" diam.) from which a bridle connected the two trawl doors (2.4 m by 1.1 m and approximately 200 kg). Sweeplines connecting trawl doors to the wings of the net were 35 fath (64 m). Three-inch rubber discs were used on the groundline. Selection of trawling sites was based on past records of cod catches by commercial and research vessels, together with current information from commercial fishermen.

All catches were sorted by species (except halibut) into plastic baskets (capacity approximately 50 kg) which were weighed on a platform scale to the nearest kilogram. All Pacific halibut were measured fork length, prior to discard, and individual weights obtained from a length-weight table provided by the International Pacific Halibut Commission.

Length measurements of all specimens were fork length to the nearest centimeter. Fork lengths were collected from all Pacific cod specimens caught.

Fork length (cm) and weight (gm) was collected from a stratified sample of English sole. Weights of individual specimens were collected while the ship was at anchor, with a digimetric electronic balance.

Water temperatures, from surface to bottom, were collected at selected stations in Queen Charlotte Sound and Hecate Strait with expendable bathythermographs (XBT).

Surficial sediments were collected in Hecate Strait with a Shipek grab. Preliminary assessment was made at time of sampling, but detailed analysis will be undertaken by geologists at the Geo-Science Center, Patricia Bay, B.C.

RESULTS

GENERAL

A total of 41 trawl hauls were completed, all in Hecate Strait, and 36 were deemed usable (Fig. 1). Following is a summary of the total catch, by species:

Species	Catch (kg)	%
English sole	941	11.5
Pacific halibut	914 (264)[a]	11.1
Walleye pollock	812	9.9
Spiny dogfish	786	9.6
Rock sole	571	6.9
Ratfish	560	6.8
Skates	439	5.3
Sablefish	420	5.1
Arrowtooth flounder	387	4.7
Rex sole	289	3.5
Dover sole	226	2.8
Pacific cod	213	2.6
Pacific herring	176	2.1
Other[b]	1,483	18.1
Total	8,217	100.0

[a]Number caught in parentheses.

[b]Other includes invertebrates (1,116 kg-13.6%) and fish species of less than 1% of the total catch.

Detailed records by haul are contained in Appendix table 1, and a list of common and scientific names of all species reported is in Appendix table 2.

A total of 6,991 specimens (comprising 9 species) were sampled for fork length (Table 1). Length-frequencies, by haul, are contained in Appendix tables 3-8, as noted in Table 1. Pacific cod specimens totalled 413, from which second-dorsal fin rays were collected from 67 specimens, at selected lengths. Walleye pollock specimens totalled 3,308, virtually all juveniles. A stratified sample of length-weight data, by sex, was collected from 149 English sole (Appendix table 9). Fork length measurements were collected from all Pacific halibut caught.

ECHO-SOUNDER MAPPING

Initial echo-sounder mapping of Goose Island Bank began at 2210 h, September 21, and continued without interruption until 1213 h September 24 (Fig. 2). Results were plotted and we found that lines LL-SS and TT-II displayed exactly opposite terrain -- the former was deemed totally trawlable and the latter totally untrawlable. Time and weather were favourable at the end of the cruise, so two new lines were sounded (TT'-II' and LL'-SS') between TT-II and LL-SS. These were completed from 0617 h to 1255 h on October 5. Figure 3 summarizes the results of the 1982 (Westrheim et al. 1982) and 1983 surveys. Most of Goose Island Bank appears to be untrawlable. However, the reader must realize that more detailed surveys are needed to confirm this preliminary conclusion. Appendix table 10 contains the bearings for all the "corners" of the survey. Appendix table 11 contains the locations of "untrawlable" bottom along the echo-sounder tracklines.

PACIFIC COD

Trawl hauls were completed on eight grounds in Hecate Strait--Two Peaks, Butterworth, Seal Rocks, Shell, White Rocks, Bonilla, South Bonilla, and Horseshoe (Fig. 1). Catch rates were low, and catches consisted primarily of juveniles--ages 0+ and 1+. Only two grounds yielded appreciable catches -- Shell (179 cod/h or 17 kg/h, @ 30-39 fath) and Horseshoe (192 cod/h or 77 kg/h, @ 50-59 fath) (Table 2). Although we did encounter some difficulties fishing the light shrimp trawl, the small catches probably reflected an actual low abundance (or availability) of juvenile cod. Echograms during and preceding trawling did not indicate any customary "signs" of cod, and commercial trawling was virtually nil during the survey period. Commercial landings have been subnormal throughout the year.

WATER TEMPERATURES

XBT casts totalled 18---7 in Queen Charlotte Sound, 7 in Hecate Strait, and 4 on the boundary between the two regions (Fig. 4). Details on

each cast are contained in Appendix table 12. Water temperatures were abnormal at all stations. For example, at Station No. 5 (Queen Charlotte Sound), 1983 temperatures at 60 fath (a common depth for commercial catches of cod) were 9.2°C in April, 8.2 in June, and 8.0 in September, compared to 7.0 in July 1982, and 6.6 in August 1981 (Table 3). Similarly, for Station No. 21 (Hecate Strait) at 40 fath (a common depth for cod catches), 1983 temperatures were 8.7°C in April, 9.0 in June, and 9.6 in September, compared to 7.8 in July 1982 and 8.3 in August 1981.

SURFICIAL SEDIMENTS

Surficial sediments were sampled at 19 sites, all in Hecate Strait --9 on Dundas Ground, and 10 on Horseshoe Ground (Fig. 4). Details are contained in Appendix table 13. Somewhat surprising was the prominence of sand on Dundas Ground as deep as 81 fath. These are the first samples collected from this important Dover sole ground. The 1983 samples on Horseshoe Ground were completed to fill in a section not sampled in 1979 (Westrheim et al. 1980a,b).

Arrowtooth flounder technology

After leaving Prince Rupert, the following two days of trawling yielded 230 arrowtooth flounder (turbot) of an appropriate size. From this sampling, 30 whole turbot were immediately frozen for proximate analysis. The remaining specimens were iced for up to 6 days. Periodically, these iced fish were removed and filletted in sets of 49 samples. Of these samples 25 were bagged and frozen. The remaining set of 24 samples was dipped in different amino acid solutions then bagged and frozen. These samples will be evaluated for parasite infestation, lipid oxidation, protein degradation, protein water holding capacity, textural integrity, and protein content at the Vancouver Technology Laboratory.

MISCELLANEOUS

A sample of juvenile (<20 cm) Pacific ocean perch was collected for B. M. Leaman at PBS.

A sample of juvenile walleye pollock (ages 0+ and 1+) was collected for G. A. McFarlane at PBS.

Single specimens of S. caurinus, S. maliger, and S. pinniger were collected for A. V. Tyler at PBS.

A stratified sample of 173 English sole (29 males and 144 females) was collected from which lengths and weights were recorded to augment a sample collected in Hecate Strait during June 1983 (Fargo et al. 1984). Mean weights by centimeter interval are contained in Appendix table 9.

PORT CALLS

One port call occurred, in Prince Rupert--1400 h September 27 to 1010 h September 29. Initial purpose was to pick up a technologist from the Vancouver Laboratory and load ice for his experiments. Delay in loading the ice, and a RADAR breakdown caused the extended stay.

PERSONNEL

S. J. Westrheim (i/c)	Pacific Biological Station	Sep 20-Oct 6
R. P. Foucher	"	"
J. Cooper	"	"
G. T. Kawamoto	Vancouver Technology Laboratory	Sep 27-Oct 6
M. F. LaPointe	University of British Columbia	"

REFERENCES

Fargo, J., J. Cooper, G. C. Hope, and S. J. Westrheim. 1983. Trawl survey of juvenile flatfish in Hecate Strait by the M/V DOUBLE DECKER, April 12-29, 1983. Can. Data Rep. Fish. Aquat. Sci. 404: 77 p.

Fargo, J., R. P. Foucher, S. C. Shields, and D. Ross. 1984. English sole tagging in Hecate Strait, R/V G.B. REED, June 6-24, 1983. Can. Data Rep. Fish. Aquat. Sci. 427: 49 p.

Fargo, J., T. Hoyt, and K. Robinson. 1982. Trawl survey of juveile flatfish in Hecate Strait, M/V ARCTIC OCEAN, August 6-21, 1981. Can. Data Rep. Fish. Aquat. Sci. 324: 110 p.

Westrheim, S. J., R. P. Foucher, W. R. Harling, and W. Shaw. 1980a. G.B. REED Groundfish Cruise No. 79-4, June 26-July 13, 1979. Can. Data Rep. Fish. Aquat. Sci. 179: 73 p.

Westrheim, S. J., R. P. Foucher, W. R. Harling, and W. Shaw. 1980b. G.B. REED Groundfish Cruise No. 79-6, September 6-21, 1979. Can. Data Rep. Fish. Aquat. Sci. 191: 64 p.

Westrheim, S. J., W. R. Harling, M. Yamanaka, and G. H. Seaton. 1982. G.B. REED Groundfish Cruise No. 82-2, July 12-29, 1982. Can. Data Rep. Fish. Aquat. Sci. 372: 53 p.

Table 1. Summary of biological sampling (nos. of specimens), by species, during G.B. REED Groundfish Cruise No. 83-5, September 20-October 6, 1983.

Species	Appendix table	Fork length		Fin rays	Length-weight
		Total	By sex		
Pacific cod	3	413	67	67	-
Walleye pollock	4	3,308	-	-	-
Sablefish	5	249	-	-	-
Pacific halibut	6	264	-	-	-
Dover sole	7	119	-	-	-
English sole	7	235	235	-	149
Rock sole	7	1,642	-	-	-
S. alutus	8	203	-	-	-
Shiner perch	8	558	-	-	-
Total		6,991	302	67	149

Table 2. Pacific cod catch rates, by depth interval, by ground, G.B. REED Groundfish Cruise No. 83-5, September 20-October 6, 1983.

Ground	Depth interval (fath)	No. of hauls[a]	Catch rate (kg/hr)	Catch rate (no./hr)
Two Peaks	30-39	1	Tr[b]	2
	40-49	5	17	18
Butterworth	30-39	1	30	18
	40-49	1	79	35
	50-59	2	7	7
SW of Seal Rocks	20-29	1	0	0
Shell	30-39	2	17	179
White Rocks	40-49	1	0	0
	50-59	1	10	18
	60-69	1	0	0
Bonilla	50-59	3	20	15
	60-69	2	20	20
South Bonilla	40-49	1	Tr	3
	50-59	3	8	14
	60-69	2	17	17
Horseshoe	30-39	1	0	0
	40-49	6	Tr	1
	50-59	2	77	192

[a]Usable hauls only.

[b]Tr = trace.

Table 3. Mean water temperatures (°C) at selected depths from hydrographic Stations 5 (Queen Charlotte Sound) and 21 (Hecate Strait), spring-summer 1981-1983.

Depth (fath)	1983			1982	1981
	Apr[a]	Jun[b]	Sep	Jul[c]	Aug[d]
		Station No. 5 51°24' X 128°45'			
0	9.7	13.5	13.0	13.4	15.3
20	10.1	10.3	11.6	9.7	10.1
40	9.6	9.0	9.1	8.0	8.2
60	9.2	8.2	8.0	7.0	6.6
80	8.5	6.9	7.4	6.1	6.4
100	7.4	6.1	7.1	6.2	6.1
		Station No. 21 53°00' X 130°12'			
0	9.2	12.2	12.8	12.1	12.9
20	8.7	10.0	11.7	11.8	10.3
40	8.7	9.0	9.6	7.8	8.3
60	-	7.5	7.7	7.0	6.8
80	-	6.5	6.8	6.2	5.8
100	-	6.3	6.3	6.0	5.7

[a]Fargo et al. 1983.

[b]Fargo et al. 1984.

[c]Westrheim et al. 1982.

[d]Fargo et al. 1982.

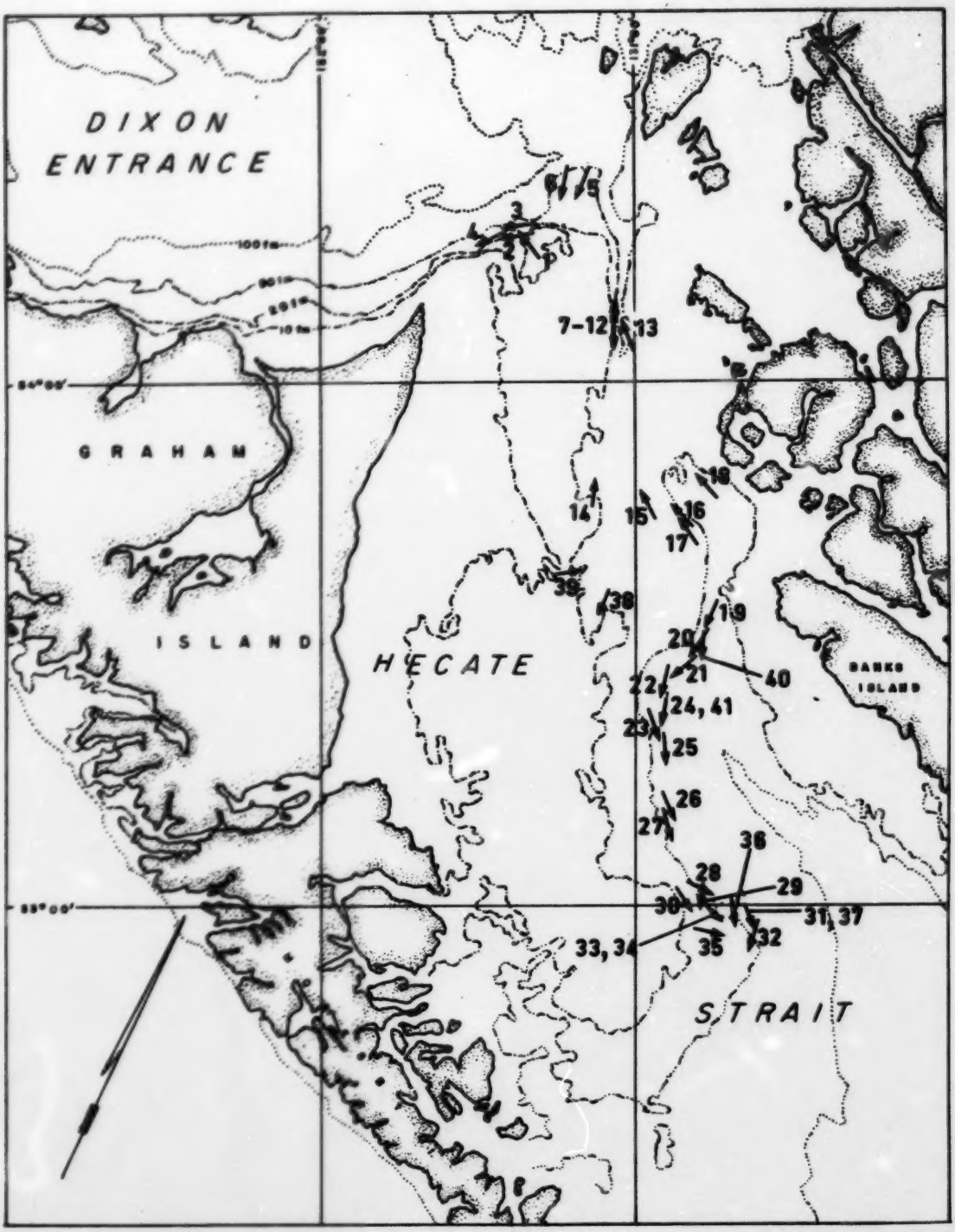

Fig. 1. Chart of Hecate Strait showing locations of trawl hauls completed during G.B. REED Groundfish Cruise No. 83-5, September 20-October 6, 1983.

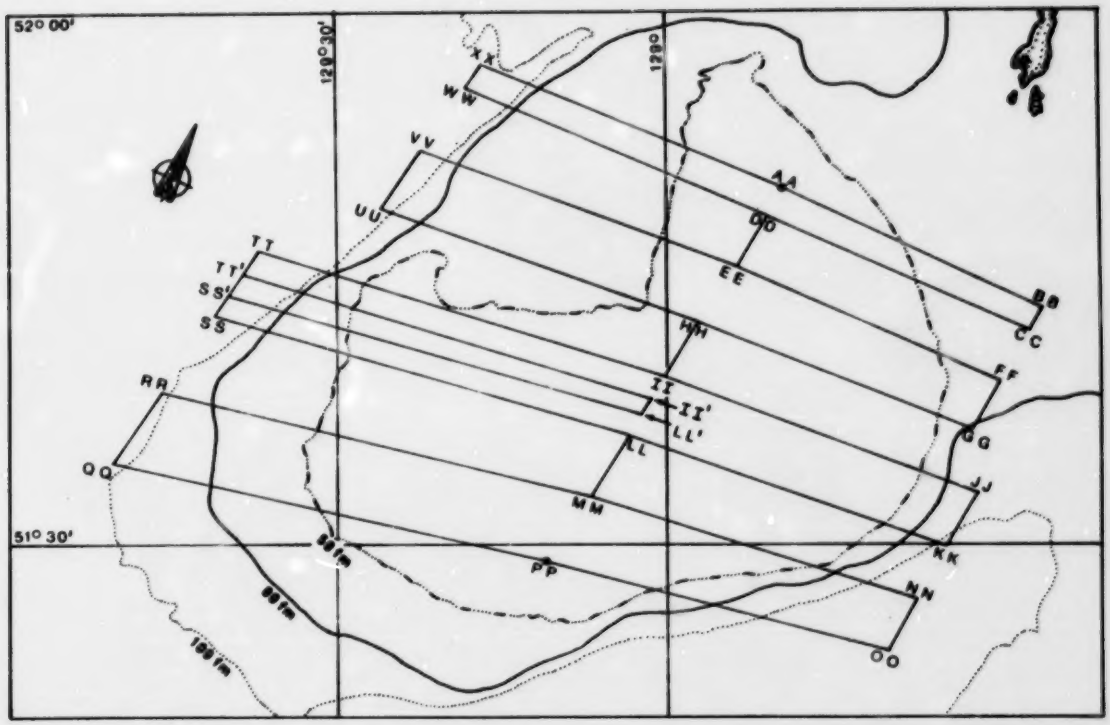

Fig. 2. Chart of Goose Island Bank (Queen Charlotte Sound) showing locations of echo-sounder tracklines traversed during G.B. REED Groundfish Cruise No. 83-5, September 20-October 6, 1983.

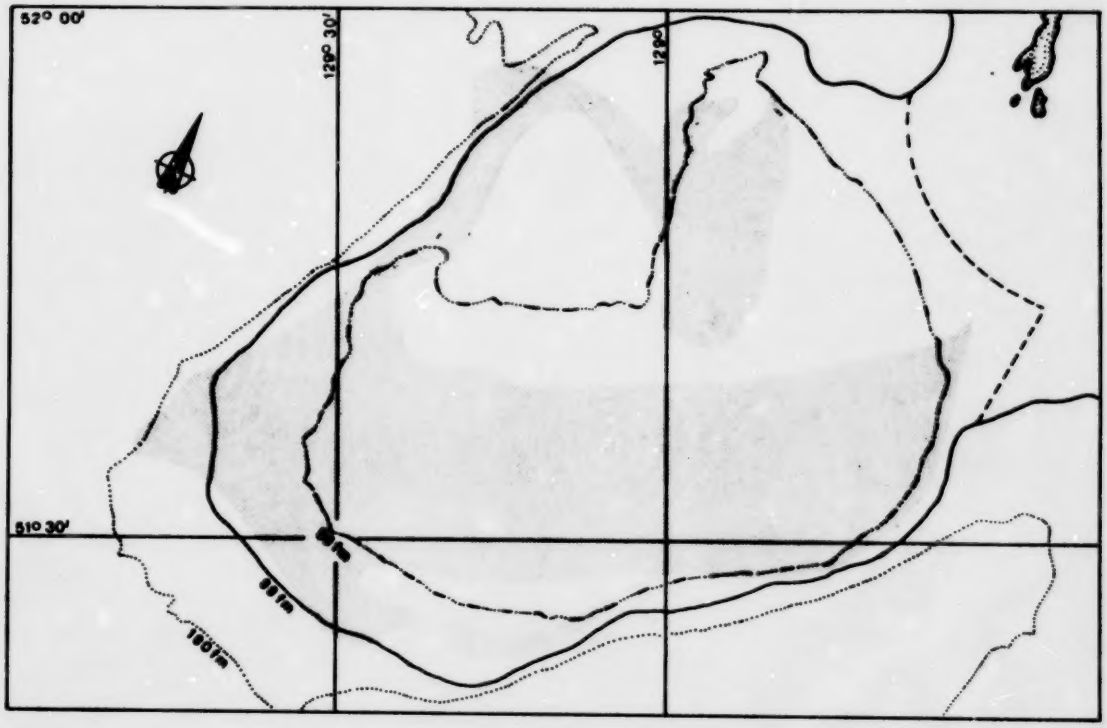

Fig. 3. Chart of Goose Island Bank (Queen Charlotte Sound) showing "untrawlable" bottom (shaded area) based on the 1982 and 1983 echo-sounder surveys. (Dashed line indicates eastern boundary of the surveys.)

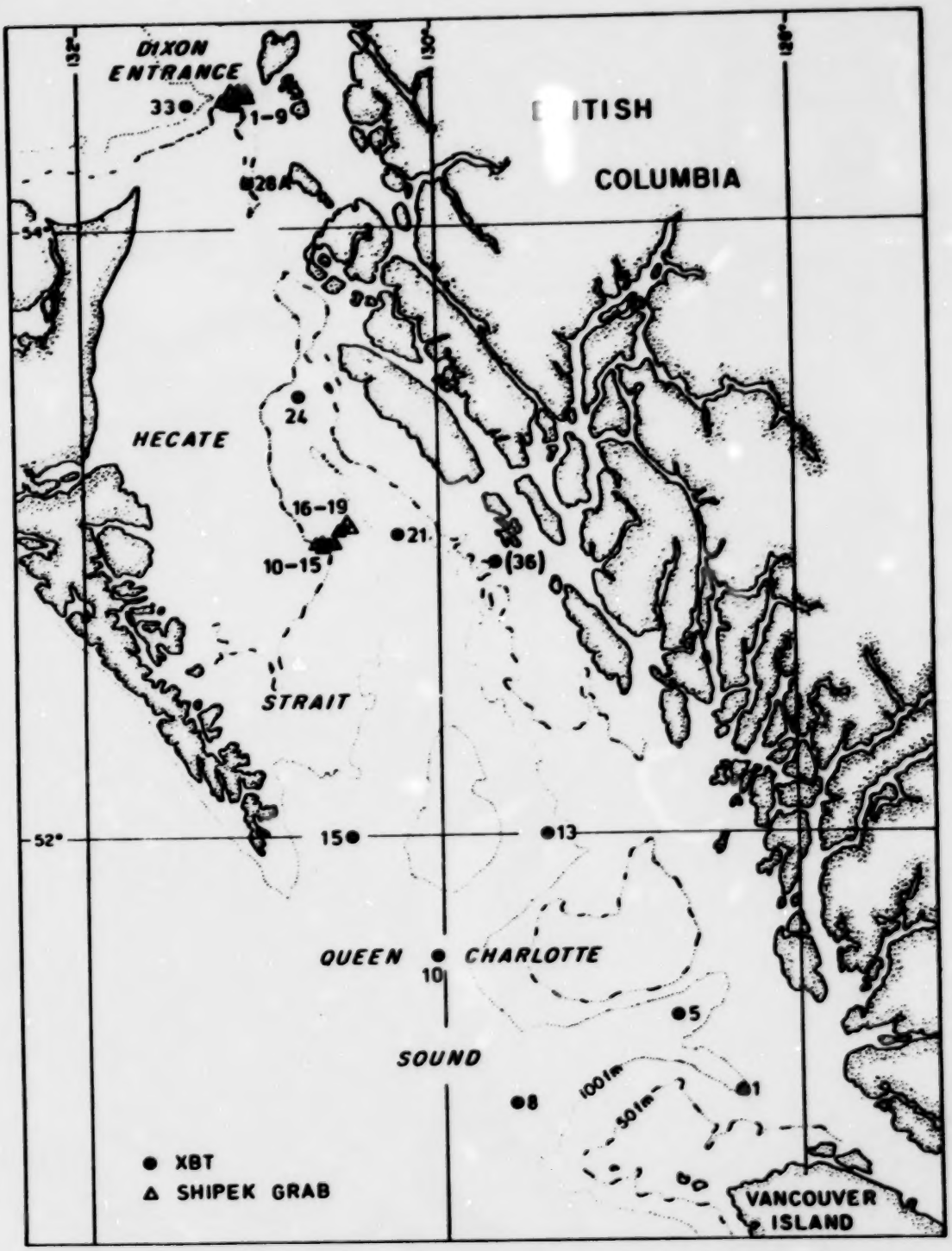

Fig. 4. Chart of Queen Charlotte Sound and Hecate Strait showing locations of XBT and shipek-grab stations occupied during G.B. REED Groundfish Cruise No. 83-5, September 20-October 6, 1983.

APPENDIX TABLES

Appendix Table 1. Fishing log, catch(kg) for G.B. REED Groundfish Cruise 83-5, September 20 - October 6, 1983.

HAUL NO.	1		2	
AREA	TWO PEAKS		TWO PEAKS	
DATE (1983)	SEP 26		SEP 26	
DEPTH INTERVAL[a] (FA)	30		40	
DURATION (H)	0.50		0.50	
DIRECTION (DEG. TRUE)	232		260	
	START	STOP	START	STOP
TIME (PDT)	10:16	10:46	12:10	12:40
LAT.(DEG,MIN)	54 17.8	54 17.1	54 17.8	54 17.5
LONG.(DEG,MIN)	131 24.3	131 25.8	131 24.9	131 26.3
DEPTH (FA)	33	30	40	41
ARROWTOOTH FLOUNDER	10		36	
BUTTER SOLE	5		4	
DOVER SOLE	-		-	
ENGLISH SOLE	4		30	
FLATHEAD SOLE	-		-	
PACIFIC HALIBUT(NO.)	36(11)		12(2)	
PACIFIC SANDDAB	-		-	
PETRALE SOLE	-		-	
REX SOLE	-		TRACE[b]	
ROCK SOLE	1		-	
OTHER FLATFISH[c]	-		-	
S. ALUTUS	-		-	
S. BREVISPINIS	-		-	
S. MALIGER	-		-	
S. PRORIGER	-		-	
OTHER ROCKFISH[d]	-		-	
EULACHON	-		-	
PACIFIC HERRING	31		8	
LINGCOD	15		-	
PACIFIC COD	TRACE		15	
SABLEFISH	-		-	
SCULPINS	-		-	
SHINER PERCH	-		-	
WALLEYE POLLOCK	2		164	
OTHER ROUNDFISH[e]	TRACE		TRACE	
RATFISH	-		-	
SKATES	30		57	
SPINY DOGFISH	13		1	
INVERTEBRATES[f]	62		176	
TOTAL CATCH (KG.)	209		503	
REMARKS	USABLE		USABLE	

Appendix Table 1. Fishing log, catch(kg) for G.B. REED Groundfish Cruise 83-5, September 20 - October 6, 1983.

HAUL NO.	3		4	
AREA	TWO PEAKS		TWO PEAKS	
DATE (1983)	SEP 26		SEP 26	
DEPTH INTERVAL (FA)[a]	40		40	
DURATION (H)	0.50		0.50	
DIRECTION (DEG. TRUE)	265		260	
	START	STOP	START	STOP
TIME (PDT)	13:47	14:17	15:25	15:55
LAT.(DEG,MIN)	54 18.0	54 17.9	54 16.5	54 16.1
LONG.(DEG,MIN)	131 24.0	131 25.9	131 30.0	131 31.6
DEPTH (FA)	47	46	44	40
ARROWTOOTH FLOUNDER	12		16	
BUTTER SOLE	9		-	
DOVER SOLE	-		-	
ENGLISH SOLE	41		13	
FLATHEAD SOLE	-		-	
PACIFIC HALIBUT(NO.)	13(5)		15(5)	
PACIFIC SANDDAB	-		-	
PETRALE SOLE	-		-	
REX SOLE	20		-	
ROCK SOLE	-		-	
OTHER FLATFISH[c]	5		-	
S. ALUTUS	-		-	
S. BREVISPINIS	2		-	
S. MALIGER	-		-	
S. PRORIGER	-		-	
OTHER ROCKFISH[d]	-		-	
EULACHON	-		-	
PACIFIC HERRING	-		TRACE	
LINGCOD	-		-	
PACIFIC COD	14		1	
SABLEFISH	-		-	
SCULPINS	-		-	
SHINER PERCH	-		-	
WALLEYE POLLOCK	13		26	
OTHER ROUNDFISH[e]	TRACE		-	
RATFISH	TRACE		25	
SKATES	6		4	
SPINY DOGFISH	30		-	
INVERTEBRATES[f]	184		4	
TOTAL CATCH (KG.)	349		104	
REMARKS	USABLE		USABLE	

Appendix Table 1. Fishing log, catch(kg) for G.B. REED Groundfish Cruise 83-5, September 20 - October 6, 1983.

HAUL NO.	5		6	
AREA	TWO PEAKS		TWO PEAKS	
DATE (1983)	SEP 27		SEP 27	
DEPTH INTERVAL[a] (FA)	40		40	
DURATION (H)	0.25		0.33	
DIRECTION (DEG. TRUE)	215		189	
	START	STOP	START	STOP
TIME (PDT)	8:13	8:28	9:00	9:20
LAT. (DEG,MIN)	54 22.9	54 22.2	54 22.6	54 21.8
LONG. (DEG,MIN)	131 12.0	131 12.7	131 14.3	131 14.6
DEPTH (FA)	40	39	47	48
ARROWTOOTH FLOUNDER	5		25	
BUTTER SOLE	-		-	
DOVER SOLE	-		TRACE	
ENGLISH SOLE	TRACE		-	
FLATHEAD SOLE	-		-	
PACIFIC HALIBUT(NO.)	173(60)		529(146)	
PACIFIC SANDDAB	-		-	
PETRALE SOLE	-		-	
REX SOLE	-		-	
ROCK SOLE	-		-	
OTHER FLATFISH[c]	-		-	
S. ALUTUS	-		-	
S. BREVISPINIS	-		-	
S. MALIGER	-		-	
S. PRORIGER	-		-	
OTHER ROCKFISH[d]	-		-	
EULACHON	-		-	
PACIFIC HERRING	6		73	
LINGCOD	-		9	
PACIFIC COD	-		6	
SABLEFISH	-		1	
SCULPINS	-		-	
SHINER PERCH	-		-	
WALLEYE POLLOCK	-		5	
OTHER ROUNDFISH[e]	-		TRACE	
RATFISH	-		-	
SKATES	13		-	
SPINY DOGFISH	13		80	
INVERTEBRATES[f]	16		100	
TOTAL CATCH (KG.)	226		828	
REMARKS	USABLE		USABLE	

Appendix Table 1. Fishing log, catch(kg) for G.B. REED Groundfish Cruise 83-5, September 20 - October 6, 1983.

HAUL NO.	7		8	
AREA	BUTTERWORTH		BUTTERWORTH	
DATE (1983)	SEP 29		SEP 29	
DEPTH INTERVAL [a] (FA)	40		50	
DURATION (H)	0.32		0.33	
DIRECTION (DEG. TRUE)	342		357	
	START	STOP	START	STOP
TIME (PDT)	13:48	14:07	14:44	15:04
LAT. (DEG,MIN)	54 08.9	54 09.9	54 08.3	54 09.3
LONG. (DEG,MIN)	131 04.9	131 05.1	131 04.3	131 04.3
DEPTH (FA)	40	40	54	57
ARROWTOOTH FLOUNDER	19		12	
BUTTER SOLE	-		-	
DOVER SOLE	5		5	
ENGLISH SOLE	29		-	
FLATHEAD SOLE	-		-	
PACIFIC HALIBUT(NO.)	11(4)		8(1)	
PACIFIC SANDDAB	-		-	
PETRALE SOLE	1		-	
REX SOLE	13		TRACE [b]	
ROCK SOLE	38		-	
OTHER FLATFISH [c]	TRACE		-	
S. ALUTUS	-		-	
S. BREVISPINIS	-		-	
S. MALIGER	-		-	
S. PRORIGER	-		-	
OTHER ROCKFISH [d]	-		-	
EULACHON	-		6	
PACIFIC HERRING	5		2	
LINGCOD	3		-	
PACIFIC COD	25		TRACE	
SABLEFISH	72		-	
SCULPINS	-		-	
SHINER PERCH	TRACE		-	
WALLEYE POLLOCK	126		6	
OTHER ROUNDFISH [e]	5		TRACE	
RATFISH	-		TRACE	
SKATES	1		-	
SPINY DOGFISH	-		14	
INVERTEBRATES [f]	1		TRACE	
TOTAL CATCH (KG.)	354		53	
REMARKS	USABLE		USABLE	

Appendix Table 1. Fishing log, catch(kg) for G.B. REED Groundfish Cruise 83-5, September 20 - October 6, 1983.

HAUL NO.	9		10	
AREA	BUTTERWORTH		BUTTERWORTH	
DATE (1983) [a]	SEP 29		SEP 29	
DEPTH INTERVAL (FA)	50		40	
DURATION (H)	0.50		0.33	
DIRECTION (DEG. TRUE)	3		2	
	START	STOP	START	STOP
TIME (PDT)	15:30	16:00	17:33	17:53
LAT.(DEG,MIN)	54 09.4	54 10.7	54 10.4	54 11.3
LONG.(DEG,MIN)	131 04.0	131 04.2	131 04.6	131 04.6
DEPTH (FA)	53	55	41	42
ARROWTOOTH FLOUNDER	-		-	
BUTTER SOLE	-		-	
DOVER SOLE	-		-	
ENGLISH SOLE	-		-	
FLATHEAD SOLE	-		-	
PACIFIC HALIBUT(NO.)	-	(-)	-	(-)
PACIFIC SANDDAB	-		-	
PETRALE SOLE	-		-	
REX SOLE	-		-	
ROCK SOLE	-		-	
OTHER FLATFISH [c]	-		-	
S. ALUTUS	-		-	
S. BREVISPINIS	-		-	
S. MALIGER	-		-	
S. PRORIGER	-		-	
OTHER ROCKFISH [d]	-		-	
EULACHON	TRACE		-	
PACIFIC HERRING	-		TRACE	
LINGCOD	-		-	
PACIFIC COD	-		-	
SABLEFISH	2		-	
SCULPINS	-		-	
SHINER PERCH	-		-	
WALLEYE POLLOCK	-		-	
OTHER ROUNDFISH [e]	-		-	
RATFISH	-		-	
SKATES	-		-	
SPINY DOGFISH	-		-	
INVERTEBRATES [f]	TRACE		TRACE	
TOTAL CATCH (KG.)	2		0	
REMARKS	UNUSABLE		UNUSABLE	

Appendix Table 1. Fishing log, catch(kg) for G.B. REED Groundfish Cruise 83-5, September 20 - October 6, 1983.

HAUL NO.	11		12	
AREA	BUTTERWORTH		BUTTERWORTH	
DATE (1983)	SEP 29		SEP 30	
DEPTH INTERVAL [a] (FA)	30		50	
DURATION (H)	0.33		0.50	
DIRECTION (DEG. TRUE)	2		18	
	START	STOP	START	STOP
TIME (PDT)	18:22	18:42	8:07	8:37
LAT. (DEG,MIN)	54 11.1	54 12.2	54 10.4	54 11.5
LONG. (DEG,MIN)	131 04.6	131 04.5	131 04.0	131 03.2
DEPTH (FA)	30	36	54	56
ARROWTOOTH FLOUNDER	26		22	
BUTTER SOLE	24		-	
DOVER SOLE	12		154	
ENGLISH SOLE	51		3	
FLATHEAD SOLE	-		2	
PACIFIC HALIBUT (NO.)	2(1)		- (-)	
PACIFIC SANDDAB	-		-	
PETRALE SOLE	-		-	
REX SOLE	25		35	
ROCK SOLE	-		2	
OTHER FLATFISH [c]	-		-	
S. ALUTUS	-		-	
S. BREVISPINIS	-		-	
S. MALIGER	-		-	
S. PRORIGER	-		-	
OTHER ROCKFISH [d]	-		-	
EULACHON	-		3	
PACIFIC HERRING	1		-	
LINGCOD	2		TRACE	
PACIFIC COD	10		5	
SABLEFISH	24		1	
SCULPINS	-		-	
SHINER PERCH	-		-	
WALLEYE POLLOCK	183		21	
OTHER ROUNDFISH [e]	2		TRACE	
RATFISH	144		262	
SKATES	26		-	
SPINY DOGFISH	-		8	
INVERTEBRATES [f]	50		28	
TOTAL CATCH (KG.)	582		546	
REMARKS	USABLE		USABLE	

Appendix Table 1. Fishing log, catch(kg) for G.B. REED Groundfish Cruise 83-5, September 20 - October 6, 1983.

HAUL NO.	13		14	
AREA	BUTTERWORTH		SW OF SEAL ROCKS	
DATE (1983)	SEP 30		SEP 30	
DEPTH INTERVAL[a] (FA)	50		20	
DURATION (H)	0.50		0.50	
DIRECTION (DEG. TRUE)	352		1	
	START	STOP	START	STOP
TIME (PDT)	9:25	9:55	12:28	12:58
LAT.(DEG,MIN)	54 07.0	54 08.4	53 48.8	53 50.3
LONG.(DEG,MIN)	131 03.5	131 04.2	131 09.7	131 09.7
DEPTH (FA)	54	56	24	25
ARROWTOOTH FLOUNDER	-		-	
BUTTER SOLE	-		-	
DOVER SOLE	2		-	
ENGLISH SOLE	-		TRACE	
FLATHEAD SOLE	-		-	
PACIFIC HALIBUT(NO.)	-	(-)	-	(-)
PACIFIC SANDDAB	-		-	
PETRALE SOLE	-		-	
REX SOLE	1		-	
ROCK SOLE	-		29	
OTHER FLATFISH[c]	-		TRACE	
S. ALUTUS	-		-	
S. BREVISPINIS	-		-	
S. MALIGER	-		4	
S. PRORIGER	-		-	
OTHER ROCKFISH[d]	-		-	
EULACHON	TRACE		-	
PACIFIC HERRING	-		TRACE	
LINGCOD	-		1	
PACIFIC COD	-		-	
SABLEFISH	-		-	
SCULPINS	-		TRACE	
SHINER PERCH	-		TRACE	
WALLEYE POLLOCK	-		-	
OTHER ROUNDFISH[e]	-		1	
RATFISH	3		-	
SKATES	-		-	
SPINY DOGFISH	4		56	
INVERTEBRATES[f]	TRACE		82	
TOTAL CATCH (KG.)	10		173	
REMARKS	UNUSABLE		USABLE	

Appendix Table 1. Fishing log, catch(kg) for G.B. REED Groundfish Cruise 83-5, September 20 - October 6, 1983.

HAUL NO.	15		16	
AREA	WHITE ROCKS		WHITE ROCKS	
DATE (1983)	SEP 30		SEP 30	
DEPTH INTERVAL[a] (FA)	30		40	
DURATION (H)	0.50		0.50	
DIRECTION (DEG. TRUE)	330		317	
	START	STOP	START	STOP
TIME (PDT)	14:08	14:38	15:35	16:05
LAT.(DEG,MIN)	53 47.5	53 48.9	53 45.9	53 46.9
LONG.(DEG,MIN)	130 59.3	131 00.5	130 53.7	130 54.8
DEPTH (FA)	32	41	48	48
ARROWTOOTH FLOUNDER	-		4	
BUTTER SOLE	-		-	
DOVER SOLE	-		2	
ENGLISH SOLE	-		45	
FLATHEAD SOLE	-		TRACE	
PACIFIC HALIBUT(NO.)	8(3)		3(1)	
PACIFIC SANDDAB	-		TRACE	
PETRALE SOLE	-		4	
REX SOLE	-		41	
ROCK SOLE	15		-	
OTHER FLATFISH[c]	-		-	
S. ALUTUS	-		TRACE	
S. BREVISPINIS	-		-	
S. MALIGER	-		-	
S. PRORIGER	-		-	
OTHER ROCKFISH[d]	-		-	
EULACHON	-		-	
PACIFIC HERRING	TRACE		6	
LINGCOD	-		TRACE	
PACIFIC COD	-		5	
SABLEFISH	-		13	
SCULPINS	-		-	
SHINER PERCH	-		-	
WALLEYE POLLOCK	TRACE		2	
OTHER ROUNDFISH[e]	-		TRACE	
RATFISH	TRACE		-	
SKATES	-		2	
SPINY DOGFISH	18		34	
INVERTEBRATES[f]	6		6	
TOTAL CATCH (KG.)	47		167	
REMARKS	UNUSABLE		USABLE	

Appendix Table 1. Fishing log, catch(kg) for G.B. REED Groundfish Cruise 83-5, September 20 - October 6, 1983.

HAUL NO.	17		18	
AREA	WHITE ROCKS		WHITE ROCKS	
DATE (1983)	SEP 30		SEP 30	
DEPTH INTERVAL[a] (FA)	50		60	
DURATION (H)	0.50		0.50	
DIRECTION (DEG. TRUE)	315		320	
	START	STOP	START	STOP
TIME (PDT)	17:32	18:02	18:53	19:23
LAT. (DEG,MIN)	53 44.8	53 45.8	53 43.8	53 44.7
LONG. (DEG,MIN)	130 50.2	130 51.9	130 47.0	130 48.3
DEPTH (FA)	56	55	66	64
ARROWTOOTH FLOUNDER	5		141	
BUTTER SOLE	-		-	
DOVER SOLE	-		29	
ENGLISH SOLE	46		60	
FLATHEAD SOLE	-		-	
PACIFIC HALIBUT (NO.)	2(1)		15(4)	
PACIFIC SANDDAB	-		-	
PETRALE SOLE	-		-	
REX SOLE	10		11	
ROCK SOLE	-		-	
OTHER FLATFISH[c]	2		-	
S. ALUTUS	TRACE		1	
S. BREVISPINIS	-		-	
S. MALIGER	-		-	
S. PRORIGER	TRACE		-	
OTHER ROCKFISH[d]	-		-	
EULACHON	-		6	
PACIFIC HERRING	15		TRACE	
LINGCOD	1		TRACE	
PACIFIC COD	5		-	
SABLEFISH	17		242	
SCULPINS	-		-	
SHINER PERCH	-		-	
WALLEYE POLLOCK	22		24	
OTHER ROUNDFISH[e]	TRACE		-	
RATFISH	4		31	
SKATES	16		11	
SPINY DOGFISH	92		248	
INVERTEBRATES[f]	TRACE		-	
TOTAL CATCH (KG.)	237		819	
REMARKS	USABLE		USABLE	

Appendix Table 1. Fishing log, catch(kg) for G.B. REED Groundfish Cruise 83-5, September 20 - October 6, 1983.

HAUL NO.	19		20	
AREA	BONILLA		BONILLA	
DATE (1983)	OCT 1		OCT 1	
DEPTH INTERVAL[a] (FA)	50		50	
DURATION (H)	0.33		0.33	
DIRECTION (DEG. TRUE)	214		217	
	START	STOP	START	STOP
TIME (PDT)	9:05	9:25	10:14	10:34
LAT.(DEG,MIN)	53 32.9	53 31.9	53 29.5	53 28.8
LONG.(DEG,MIN)	130 46.1	130 47.0	130 49.0	130 50.0
DEPTH (FA)	56	58	58	59
ARROWTOOTH FLOUNDER	5		-	
BUTTER SOLE	-		-	
DOVER SOLE	2		-	
ENGLISH SOLE	28		38	
FLATHEAD SOLE	2		-	
PACIFIC HALIBUT(NO.)	8(2)		- (-)	
PACIFIC SANDDAB	-		-	
PETRALE SOLE	-		8	
REX SOLE	11		6	
ROCK SOLE	-		-	
OTHER FLATFISH[c]	-		-	
S. ALUTUS	TRACE		TRACE	
S. BREVISPINIS	-		-	
S. MALIGER	-		-	
S. PRORIGER	-		5	
OTHER ROCKFISH[d]	-		-	
EULACHON	4		-	
PACIFIC HERRING	3		1	
LINGCOD	1		-	
PACIFIC COD	3		7	
SABLEFISH	5		5	
SCULPINS	-		-	
SHINER PERCH	-		-	
WALLEYE POLLOCK	71		40	
OTHER ROUNDFISH[e]	-		-	
RATFISH	11		9	
SKATES	-		6	
SPINY DOGFISH	32		7	
INVERTEBRATES[f]	TRACE		TRACE	
TOTAL CATCH (KG.)	186		132	
REMARKS	USABLE		USABLE	

Appendix Table 1. Fishing log, catch(kg) for G.B. REED Groundfish Cruise 83-5, September 20 - October 6, 1983.

HAUL NO.	21		22	
AREA	BONILLA		BONILLA	
DATE (1983)	OCT 1		OCT 1	
DEPTH INTERVAL[a](FA)	50		60	
DURATION (H)	0.20		0.33	
DIRECTION (DEG. TRUE)	227		205	
	START	STOP	START	STOP
TIME (PDT)	12:16	12:28	13:09	13:29
LAT.(DEG,MIN)	53 27.7	53 27.3	53 25.9	53 25.2
LONG.(DEG,MIN)	130 53.0	130 53.6	130 55.0	130 56.0
DEPTH (FA)	57	59	60	59
ARROWTOOTH FLOUNDER	9		13	
BUTTER SOLE	-		-	
DOVER SOLE	TRACE		-	
ENGLISH SOLE	68		32	
FLATHEAD SOLE	-		-	
PACIFIC HALIBUT(NO.)	12(3)		20(5)	
PACIFIC SANDDAB	TRACE		-	
PETRALE SOLE	2		5	
REX SOLE	10		17	
ROCK SOLE	-		-	
OTHER FLATFISH[c]	-		-	
S. ALUTUS	-		TRACE	
S. BREVISPINIS	-		-	
S. MALIGER	-		-	
S. PRORIGER	-		-	
OTHER ROCKFISH[d]	-		-	
EULACHON	-		-	
PACIFIC HERRING	7		8	
LINGCOD	-		TRACE	
PACIFIC COD	7		11	
SABLEFISH	16		12	
SCULPINS	-		-	
SHINER PERCH	-		-	
WALLEYE POLLOCK[e]	8		28	
OTHER ROUNDFISH	TRACE		-	
RATFISH	3		33	
SKATES	-		-	
SPINY DOGFISH	9		5	
INVERTEBRATES[f]	1		14	
TOTAL CATCH (KG.)	152		198	
REMARKS	USABLE		USABLE	

Appendix Table 1. Fishing log, catch(kg) for G.B. REED Groundfish Cruise 83-5, September 20 - October 6, 1983.

HAUL NO.	23		24	
AREA	SOUTH BONILLA		SOUTH BONILLA	
DATE (1983)	OCT 1		OCT 1	
DEPTH INTERVAL[a] (FA)	50		60	
DURATION (H)	0.33		0.28	
DIRECTION (DEG. TRUE)	155		184	
	START	STOP	START	STOP
TIME (PDT)	14:31	14:51	15:38	15:55
LAT.(DEG,MIN)	53 20.8	53 20.0	53 22.3	53 21.7
LONG.(DEG,MIN)	130 56.1	130 55.3	130 55.2	130 55.2
DEPTH (FA)	57	55	64	65
ARROWTOOTH FLOUNDER	-		7	
BUTTER SOLE	-		-	
DOVER SOLE	-		-	
ENGLISH SOLE	140		7	
FLATHEAD SOLE	-		-	
PACIFIC HALIBUT(NO.)	34(8)		- (-)	
PACIFIC SANDDAB	TRACE		TRACE	
PETRALE SOLE	13		-	
REX SOLE	-		3	
ROCK SOLE	3		-	
OTHER FLATFISH[c]	-		-	
S. ALUTUS	-		1	
S. BREVISPINIS	-		-	
S. MALIGER	-		-	
S. PRORIGER	-		-	
OTHER ROCKFISH[d]	-		-	
EULACHON	-		TRACE	
PACIFIC HERRING	5		1	
LINGCOD	-		TRACE	
PACIFIC COD	6		7	
SABLEFISH	-		-	
SCULPINS	-		-	
SHINER PERCH	-		-	
WALLEYE POLLOCK	-		21	
OTHER ROUNDFISH[e]	-		TRACE	
RATFISH	-		11	
SKATES	-		TRACE	
SPINY DOGFISH	16		4	
INVERTEBRATES[f]	1		25	
TOTAL CATCH (KG.)	218		87	
REMARKS	USABLE		USABLE	

Appendix Table 1. Fishing log, catch(kg) for G.B. REED Groundfish Cruise 83-5, September 20 - October 6, 1983.

HAUL NO.	25		26	
AREA	SOUTH BONILLA		SOUTH BONILLA	
DATE (1983)	OCT 2		OCT 2	
DEPTH INTERVAL[a] (FA)	50		50	
DURATION (H)	0.33		0.33	
DIRECTION (DEG. TRUE)	172		165	
	START	STOP	START	STOP
TIME (PDT)	8:16	8:36	9:40	10:00
LAT. (DEG,MIN)	53 17.8	53 16.9	53 10.9	53 10.4
LONG. (DEG,MIN)	130 55.0	130 54.7	130 53.9	130 54.8
DEPTH (FA)	56	56	54	54
ARROWTOOTH FLOUNDER	-		-	
BUTTER SOLE	-		-	
DOVER SOLE	1		-	
ENGLISH SOLE	29		15	
FLATHEAD SOLE	6		-	
PACIFIC HALIBUT (NO.)	- (-)		- (-)	
PACIFIC SANDDAB	4		6	
PETRALE SOLE	1		-	
REX SOLE	19		11	
ROCK SOLE	17		17	
OTHER FLATFISH[c]	TRACE		-	
S. ALUTUS	TRACE		-	
S. BREVISPINIS	-		-	
S. MALIGER	-		-	
S. PRORIGER	-		-	
OTHER ROCKFISH[d]	-		-	
EULACHON	-		-	
PACIFIC HERRING	1		-	
LINGCOD	-		-	
PACIFIC COD	2		TRACE	
SABLEFISH	3		1	
SCULPINS	-		-	
SHINER PERCH	-		TRACE	
WALLEYE POLLOCK	-		2	
OTHER ROUNDFISH[e]	-		-	
RATFISH	9		-	
SKATES	2		-	
SPINY DOGFISH	8		3	
INVERTEBRATES[f]	2		1	
TOTAL CATCH (KG.)	104		56	
REMARKS	USABLE		USABLE	

Appendix Table 1. Fishing log, catch(kg) for G.B. REED Groundfish Cruise 83-5, September 20 - October 6, 1983.

HAUL NO.	27		28	
AREA	SOUTH BONILLA		SOUTH BONILLA	
DATE (1983)	OCT 2		OCT 2	
DEPTH INTERVAL[a] (FA)	40		50	
DURATION (H)	0.33		0.33	
DIRECTION (DEG. TRUE)	170		138	
	START	STOP	START	STOP
TIME (PDT)	10:43	11:03	12:37	12:57
LAT. (DEG,MIN)	53 08.8	53 08.1	53 01.2	53 00.5
LONG. (DEG,MIN)	130 54.8	130 54.7	130 48.2	130 47.1
DEPTH (FA)	46	46	48	51
ARROWTOOTH FLOUNDER	-		-	
BUTTER SOLE	TRACE		-	
DOVER SOLE	TRACE		1	
ENGLISH SOLE	12		17	
FLATHEAD SOLE	-		-	
PACIFIC HALIBUT(NO.)	- (-)		- (-)	
PACIFIC SANDDAB	21		2	
PETRALE SOLE	2		-	
REX SOLE	8		18	
ROCK SOLE	20		TRACE	
OTHER FLATFISH[c]	-		-	
S. ALUTUS	-		-	
S. BREVISPINIS	-		-	
S. MALIGER	-		-	
S. PRORIGER	-		-	
OTHER ROCKFISH[d]	-		1	
EULACHON	-		-	
PACIFIC HERRING	-		TRACE	
LINGCOD	-		-	
PACIFIC COD	TRACE		TRACE	
SABLEFISH	1		TRACE	
SCULPINS	-		-	
SHINER PERCH	-		-	
WALLEYE POLLOCK	-		4	
OTHER ROUNDFISH[e]	TRACE		-	
RATFISH	-		-	
SKATES	-		-	
SPINY DOGFISH	5		17	
INVERTEBRATES[f]	TRACE		1	
TOTAL CATCH (KG.)	69		61	
REMARKS	USABLE		USABLE	

Appendix Table 1. Fishing log, catch(kg) for G.B. REED Groundfish Cruise 83-5, September 20 - October 6, 1983.

HAUL NO.	29		30	
AREA	HORSESHOE		HORSESHOE	
DATE (1983)	OCT 2		OCT 2	
DEPTH INTERVAL[a] (FA)	40		30	
DURATION (H)	0.33		0.33	
DIRECTION (DEG. TRUE)	183		143	
	START	STOP	START	STOP
TIME (PDT)	13:30	13:50	14:34	14:54
LAT.(DEG,MIN)	53 00.1	52 59.1	53 00.1	52 59.4
LONG.(DEG,MIN)	130 48.4	130 48.1	130 50.5	130 45.5
DEPTH (FA)	44	41	35	36
ARROWTOOTH FLOUNDER	TRACE		-	
BUTTER SOLE	TRACE		-	
DOVER SOLE	TRACE		-	
ENGLISH SOLE	102		-	
FLATHEAD SOLE	-		-	
PACIFIC HALIBUT(NO.)	13(2)		-	(-)
PACIFIC SANDDAB	9		-	
PETRALE SOLE	TRACE		-	
REX SOLE	16		-	
ROCK SOLE	TRACE		-	
OTHER FLATFISH[c]	-		-	
S. ALUTUS	-		-	
S. BREVISPINIS	-		-	
S. MALIGER	-		-	
S. PRORIGER	-		-	
OTHER ROCKFISH[d]	-		-	
EULACHON	-		-	
PACIFIC HERRING	1		-	
LINGCOD	4		-	
PACIFIC COD	1		-	
SABLEFISH	1		-	
SCULPINS	-		-	
SHINER PERCH	TRACE		-	
WALLEYE POLLOCK	TRACE		-	
OTHER ROUNDFISH[e]	TRACE		-	
RATFISH	-		-	
SKATES	16		-	
SPINY DOGFISH	48		-	
INVERTEBRATES[f]	6		-	
TOTAL CATCH (KG.)	217		0	
REMARKS	USABLE		UNUSABLE	

Appendix Table 1. Fishing log, catch(kg) for G.B. REED Groundfish Cruise 83-5, September 20 - October 6, 1983.

HAUL NO.	31		32	
AREA	HORSESHOE		HORSESHOE	
DATE (1983)	OCT 3		OCT 3	
DEPTH INTERVAL[a] (FA)	40		40	
DURATION (H)	0.33		0.33	
DIRECTION (DEG. TRUE)	152		198	
	START	STOP	START	STOP
TIME (PDT)	9:20	9:40	10:08	10:28
LAT. (DEG,MIN)	52 58.0	52 57.6	52 57.0	52 56.3
LONG. (DEG,MIN)	130 39.2	130 38.8	130 38.0	130 38.4
DEPTH (FA)	42	41	44	44
ARROWTOOTH FLOUNDER	-		-	
BUTTER SOLE	TRACE		2	
DOVER SOLE	-		-	
ENGLISH SOLE	TRACE		3	
FLATHEAD SOLE	-		-	
PACIFIC HALIBUT (NO.)	- (-)		- (-)	
PACIFIC SANDDAB	TRACE		TRACE	
PETRALE SOLE	-		-	
REX SOLE	-		TRACE[b]	
ROCK SOLE	24		5	
OTHER FLATFISH[c]	-		-	
S. ALUTUS	-		-	
S. BREVISPINIS	-		-	
S. MALIGER	-		-	
S. PRORIGER	-		-	
OTHER ROCKFISH[d]	-		-	
EULACHON	-		-	
PACIFIC HERRING	TRACE		-	
LINGCOD	-		-	
PACIFIC COD	-		-	
SABLEFISH	-		-	
SCULPINS	-		-	
SHINER PERCH	-		-	
WALLEYE POLLOCK	-		-	
OTHER ROUNDFISH[e]	TRACE		TRACE	
RATFISH	-		-	
SKATES	46		33	
SPINY DOGFISH	-		-	
INVERTEBRATES[f]	2		8	
TOTAL CATCH (KG.)	72		51	
REMARKS	USABLE		USABLE	

Appendix Table 1. Fishing log, catch(kg) for G.B. REED Groundfish Cruise 83-5, September 20 - October 6, 1983.

HAUL NO.	33		34	
AREA	HORSESHOE		HORSESHOE	
DATE (1983)	OCT 3		OCT 3	
DEPTH INTERVAL[a] (FA)	40		40	
DURATION (H)	0.33		0.33	
DIRECTION (DEG. TRUE)	119		107	
	START	STOP	START	STOP
TIME (PDT)	12:11	12:31	12:55	13:15
LAT.(DEG,MIN)	52 58.9	52 58.4	52 58.2	52 58.1
LONG.(DEG,MIN)	130 45.8	130 44.5	130 45.7	130 44.5
DEPTH (FA)	46	44	41	40
ARROWTOOTH FLOUNDER	-		-	
BUTTER SOLE	-		-	
DOVER SOLE	-		-	
ENGLISH SOLE	8		2	
FLATHEAD SOLE	-		-	
PACIFIC HALIBUT(NO.)	- (-)		- (-)	
PACIFIC SANDDAB	TRACE		TRACE	
PETRALE SOLE	-		TRACE	
REX SOLE	-		-	
ROCK SOLE	TRACE		8	
OTHER FLATFISH[c]	-		TRACE	
S. ALUTUS	-		-	
S. BREVISPINIS	-		-	
S. MALIGER	-		-	
S. PRORIGER	-		-	
OTHER ROCKFISH[d]	-		-	
EULACHON	-		-	
PACIFIC HERRING	1		-	
LINGCOD	-		-	
PACIFIC COD	-		-	
SABLEFISH	-		-	
SCULPINS	-		-	
SHINER PERCH	7		TRACE	
WALLEYE POLLOCK	-		-	
OTHER ROUNDFISH[e]	TRACE		TRACE	
RATFISH	-		-	
SKATES	-		-	
SPINY DOGFISH	-		-	
INVERTEBRATES[f]	1		TRACE	
TOTAL CATCH (KG.)	17		10	
REMARKS	USABLE		USABLE	

Appendix Table 1. Fishing log, catch(kg) for G.B. REED Groundfish Cruise 83-5, September 20 - October 6, 1983.

HAUL NO.	35		36	
AREA	HORSESHOE		HORSESHOE	
DATE (1983)	OCT 3		OCT 3	
DEPTH INTERVAL[a] (FA)	30		50	
DURATION (H)	0.33		0.50	
DIRECTION (DEG. TRUE)	117		141	
	START	STOP	START	STOP
TIME (PDT)	13:51	14:11	15:11	15:41
LAT.(DEG,MIN)	52 57.4	52 57.1	52 59.0	52 58.0
LONG.(DEG,MIN)	130 45.3	130 44.1	130 41.4	130 39.7
DEPTH (FA)	31	32	58	33
ARROWTOOTH FLOUNDER	-		-	
BUTTER SOLE	-		-	
DOVER SOLE	-		TRACE	
ENGLISH SOLE	TRACE		46	
FLATHEAD SOLE	-		-	
PACIFIC HALIBUT(NO.)	- (-)		- (-)	
PACIFIC SANDDAB	TRACE		4	
PETRALE SOLE	-		1	
REX SOLE	-		TRACE[b]	
ROCK SOLE	16		40	
OTHER FLATFISH[c]	-		-	
S. ALUTUS	-		-	
S. BREVISPINIS	-		-	
S. MALIGER	-		-	
S. PRORIGER	-		-	
OTHER ROCKFISH[d]	-		-	
EULACHON	-		-	
PACIFIC HERRING	-		1	
LINGCOD	-		-	
PACIFIC COD	-		64	
SABLEFISH	-		-	
SCULPINS	-		-	
SHINER PERCH	-		TRACE	
WALLEYE POLLOCK[e]	-		-	
OTHER ROUNDFISH	-		-	
RATFISH	-		-	
SKATES	90		17	
SPINY DOGFISH	-		6	
INVERTEBRATES[f]	8		1	
TOTAL CATCH (KG.)	114		180	
REMARKS	USABLE		USABLE	

Appendix Table 1. Fishing log, catch(kg) for G.B. REED Groundfish Cruise 83-5, September 20 - October 6, 1983.

HAUL NO.	37		38	
AREA	HORSESHOE		SHELL	
DATE (1983)	OCT 3		OCT 4	
DEPTH INTERVAL[a] (FA)	40		30	
DURATION (H)	0.50		0.33	
DIRECTION (DEG. TRUE)	296		211	
	START	STOP	START	STOP
TIME (PDT)	17:21	17:51	8:10	8:30
LAT. (DEG,MIN)	52 58.3	52 58.9	53 34.8	53 34.2
LONG. (DEG,MIN)	130 40.2	130 42.0	131 08.2	131 08.8
DEPTH (FA)	40	53	31	34
ARROWTOOTH FLOUNDER	-		-	
BUTTER SOLE	TRACE		-	
DOVER SOLE	-		TRACE	
ENGLISH SOLE	9		36	
FLATHEAD SOLE	-		-	
PACIFIC HALIBUT(NO.)	- (-)		- (-)	
PACIFIC SANDDAB	3		13	
PETRALE SOLE	-		-	
REX SOLE	TRACE		TRACE[b]	
ROCK SOLE	83		186	
OTHER FLATFISH[c]	TRACE		TRACE	
S. ALUTUS	-		-	
S. BREVISPINIS	-		-	
S. MALIGER	-		-	
S. PRORIGER	-		-	
OTHER ROCKFISH[d]	-		-	
EULACHON	-		-	
PACIFIC HERRING	-		TRACE	
LINGCOD	-		5	
PACIFIC COD	-		10	
SABLEFISH	-		1	
SCULPINS	-		34	
SHINER PERCH	-		21	
WALLEYE POLLOCK	-		TRACE	
OTHER ROUNDFISH[e]	TRACE		-	
RATFISH	-		-	
SKATES	18		19	
SPINY DOGFISH	-		-	
INVERTEBRATES[f]	10		63	
TOTAL CATCH (KG.)	123		388	
REMARKS	USABLE		USABLE	

Appendix Table 1. Fishing log, catch(kg) for G.B. REED Groundfish Cruise 83-5, September 20 - October 6, 1983.

HAUL NO.	39		40	
AREA	SHELL		BONILLA	
DATE (1983)	OCT 4		OCT 4	
DEPTH INTERVAL [a] (FA)	30		60	
DURATION (H)	0.33		0.33	
DIRECTION (DEG. TRUE)	87		187	
	START	STOP	START	STOP
TIME (PDT)	10:07	10:27	12:35	12:55
LAT. (DEG,MIN)	53 38.1	53 38.1	53 28.8	53 28.2
LONG. (DEG,MIN)	131 04.8	131 03.6	130 48.2	130 48.5
DEPTH (FA)	35	37	66	65
ARROWTOOTH FLOUNDER	-		11	
BUTTER SOLE	-		-	
DOVER SOLE	5		6	
ENGLISH SOLE	5		9	
FLATHEAD SOLE	-		TRACE	
PACIFIC HALIBUT (NO.)	- (-)		- (-)	
PACIFIC SANDDAB	-		-	
PETRALE SOLE	TRACE		-	
REX SOLE	-		2	
ROCK SOLE	67		-	
OTHER FLATFISH [c]	TRACE		-	
S. ALUTUS	-		9	
S. BREVISPINIS	-		5	
S. MALIGER	6		-	
S. PRORIGER	-		18	
OTHER ROCKFISH [d]	TRACE		TRACE	
EULACHON	-		-	
PACIFIC HERRING	-		-	
LINGCOD	10		1	
PACIFIC COD	1		2	
SABLEFISH	-		-	
SCULPINS	5		-	
SHINER PERCH	-		-	
WALLEYE POLLOCK [e]	-		5	
OTHER ROUNDFISH	5		TRACE	
RATFISH	-		5	
SKATES	22		-	
SPINY DOGFISH	5		8	
INVERTEBRATES [f]	208		21	
TOTAL CATCH (KG.)	339		102	
REMARKS	USABLE		USABLE	

Appendix Table 1. Fishing log, catch(kg) for G.B. REED Groundfish Cruise 83-5, September 20 - October 6, 1983.

HAUL NO.	41
AREA	SOUTH BONILLA
DATE (1983)	OCT 4
DEPTH INTERVAL[a] (FA)	60
DURATION (H)	0.50
DIRECTION (DEG. TRUE)	182

	START	STOP
TIME (PDT)	14:48	15:18
LAT.(DEG,MIN)	53 22.9	53 21.3
LONG.(DEG,MIN)	130 54.5	130 54.6
DEPTH (FA)	68	68

ARROWTOOTH FLOUNDER	9
BUTTER SOLE	TRACE
DOVER SOLE	2
ENGLISH SOLE	13
FLATHEAD SOLE	2
PACIFIC HALIBUT(NO.)	- (-)
PACIFIC SANDDAB	-
PETRALE SOLE	TRACE
REX SOLE	12
ROCK SOLE	-
OTHER FLATFISH[c]	-
S. ALUTUS	2
S. BREVISPINIS	-
S. MALIGER	-
S. PRORIGER	-
OTHER ROCKFISH[d]	-
EULACHON	TRACE
PACIFIC HERRING	TRACE
LINGCOD	-
PACIFIC COD	6
SABLEFISH	3
SCULPINS	-
SHINER PERCH	-
WALLEYE POLLOCK	39
OTHER ROUNDFISH[e]	TRACE
RATFISH	10
SKATES	4
SPINY DOGFISH	2
INVERTEBRATES[f]	28
TOTAL CATCH (KG.)	132
REMARKS	USABLE

Footnotes to Appendix table 1.

[a]Depth interval = 10-fathom interval in which majority of trawling occurred, e.g., 30 = 30-39 fathoms.

[b]Trace = less than 0.5 kg.

[c]Other flatfish (<10 kg total) includes curlfin sole, slender sole and starry founder.

[d]Other rockfish (<10 kg total) includes Sebastes caurinus, S. pinniger and S. zacentrus.

[e]Other roundfish (<10 kg total) includes eelpouts, greenlings, Pacific hake, Pacific tomcod, poachers and wolfeel.

[f]Invertebrate catch by haul in Appendix table 14.

Appendix table 2. Index of common and scientific names of fish species captured during G.B. REED Groundfish Cruise No. 83-5, September 20-October 6, 1983.

Common name	Scientific name
Flatfish	
Arrowtooth flounder	Atheresthes stomias
Butter sole	Isopsetta isolepis
Curlfin sole	Pleuronichthys decurrens
Dover sole	Microstomus pacificus
English sole	Parophrys vetulus
Flathead sole	Hippoglossoides elassodon
Pacific halibut	Hippoglossus stenolepis
Pacific sanddab	Citharichthys sordidus
Petrale sole	Eopsetta jordani
Rex sole	Glyptocephalus zachirus
Rock sole	Lepidopsetta bilineata
Sand sole	Psettichthys melanostictus
Slender sole	Lyopsetta exilis
Starry flounder	Platichthys stellatus
Rockfish	
Pacific ocean perch	Sebastes alutus
Silvergray rockfish	S. brevispinis
Copper rockfish	S. caurinus
Quillback rockfish	S. maliger
Canary rockfish	S. pinniger
Redstripe rockfish	S. proriger
Sharpchin rockfish	S. zacentrus
Roundfish	
Eelpouts	Zoarcidae (Family)
Eulachon	Thaleichthys pacificus
Greenlings	Hexagrammidae (Family)
Lingcod	Ophiodon elongatus
Pacific cod	Gadus macrocephalus
Pacific hake	Merluccius productus
Pacific herring	Clupea harengus pallasi
Pacific tomcod	Microgadus proximus
Sablefish	Anoplopoma fimbria
Sculpins	Cottidae (Family)
Shiner perch	Cymatogaster aggregata
Sturgeon poacher	Agonidae (Family)
Walleye pollock	Theragra chalcogramma
Wolfeel	Anarrhichthys ocellatus

Appendix table 2 (cont'd)

Common name	Scientific name
Selachii	
Ratfish	Hydrolagus colliei
Skates	Rajidae (Family)
Spiny dogfish	Squalus acanthias
Invertebrates	
Anemone	Actiniaria (Order)
Basket stars	Euryalae (Order)
Brittle stars	Ophiurae (Order)
Cockle	Clinocardium nuttalli
Crabs	Brachyura Paguridea
Cucumber	Parastichopus californicus
Nudibranch	Nudibranchiata (Suborder)
Octopus	Octopoda (Order)
Oregon triton	Fusitriton oregonensis
Prawn	Pandalus platycerous
Scallop	Pectinidae (Family)
Shrimp	Nantantia (Order)
Squid	Teuthoidea (Order)
Starfish	Asteroidea (Class)
Urchin	Echinoidea (Class)

Appendix table 3. Size composition (no. sampled), by haul, of Pacific cod sampled, during G.B. REED Groundfish Cruise N. 83-5, September 20-October 6, 1983.

Fork length	Haul no.																									
(cm)	1	2	3	4	6	7	8	11	12	16	17	19	20	21	22	23	24	25	26	27	28	29	36	38	39	40	41
14	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-
15	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-
16	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	-	-	-	-	-	-	-	-	-	-	-
17	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	-	-	-	-	-	-	-	1	-	-	-
18	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	-	-	-	-	-	-	-	11	-	-	-
19	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	-	-	-	-	-	-	-	29	-	-	-
20	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	-	-	-	-	-	-	-	41	1	-	-
21	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	-	-	-	-	-	-	-	24	1	-	-
22	-	-	1	-	-	-	-	-	-	-	-	-	-	0	-	-	-	-	-	-	-	-	-	8	0	-	-
23	-	-	0	-	-	-	-	-	-	-	-	-	-	0	-	-	-	-	-	-	-	-	-	1	0	-	-
24	-	-	0	-	-	-	-	-	-	-	-	-	-	0	-	-	-	-	-	-	-	-	-	-	0	-	-
25	-	-	0	-	-	-	-	-	-	-	-	-	-	0	-	-	-	-	-	-	-	-	-	-	0	-	-
26	-	-	0	-	-	-	-	-	-	-	-	-	-	0	-	-	-	-	-	-	-	-	-	-	0	-	-
27	-	-	0	-	-	-	-	-	-	-	-	-	-	0	-	-	-	-	-	-	-	-	-	-	0	-	-
28	-	-	0	-	-	-	-	-	-	-	-	-	-	0	-	-	-	-	-	-	-	-	-	-	0	-	-
29	-	-	0	-	-	-	-	-	-	-	-	-	-	0	-	1	-	-	1	-	-	-	3	-	0	-	-
30	-	-	0	-	-	-	-	-	-	-	1	-	-	0	-	0	-	-	-	-	-	-	4	-	1	-	-
31	-	-	0	1	-	-	-	-	-	-	0	-	-	0	-	0	-	-	-	-	-	-	14	-	0	-	-
32	1	2	0	0	-	-	-	-	-	1	1	-	-	0	-	1	-	-	-	1	1	-	17	-	0	-	-
33	-	2	0	0	-	-	-	-	-	1	0	-	1	0	-	2	-	-	-	-	-	1	15	-	0	-	-
34	-	2	0	1	-	-	-	-	1	0	0	-	0	0	-	1	-	-	-	-	-	1	16	-	0	-	-
35	-	5	2	0	-	-	-	-	0	1	2	-	0	0	-	1	-	-	-	-	-	1	15	-	0	-	1
36	-	2	0	0	-	2	-	1	1	1	1	-	2	1	5	1	-	-	-	-	-	-	21	-	0	-	1
37	-	5	1	0	-	0	1	0	0	0	1	-	0	0	0	2	1	-	-	-	-	-	11	-	0	-	0
38	-	1	0	0	-	0	-	0	1	0	1	-	0	1	1	2	1	-	-	-	-	-	6	-	1	-	0
39	-	2	1	0	-	1	-	0	0	0	1	-	1	0	0	0	0	-	-	-	-	-	20	-	-	-	0
40	-	0	1	1	-	0	-	1	2	0	0	1	0	0	2	0	2	-	-	-	-	-	4	-	-	-	1
41	-	1	1	-	-	0	-	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	6	-	-	-	1
42	-	0	0	-	1	0	-	0	0	0	0	0	0	0	1	1	0	-	-	-	-	-	3	-	-	-	0
43	-	1	0	-	0	0	-	0	0	0	0	0	0	0	1	-	0	-	-	-	-	-	2	-	-	-	0
44	-	-	0	-	0	0	-	0	0	0	0	0	0	0	0	-	0	-	-	-	-	-	1	-	-	-	1
45	-	-	0	-	0	0	-	0	0	0	0	0	0	0	0	-	0	-	-	-	-	-	0	-	-	-	0
46	-	-	0	-	0	0	-	0	0	0	0	0	0	0	0	-	0	-	-	-	-	-	0	-	-	-	0
47	-	-	0	-	0	0	-	0	0	0	0	0	0	0	0	-	0	-	-	-	-	-	0	-	-	-	0
48	-	-	0	-	0	0	-	0	0	0	1	0	0	0	0	-	0	-	-	-	-	-	0	-	-	-	0
49	-	-	0	-	0	0	-	0	0	0	-	0	0	0	0	-	0	-	-	-	-	-	1	-	-	-	0
50	-	-	0	-	0	0	-	0	0	0	-	0	0	0	0	-	0	-	-	-	-	-	-	-	-	-	0

Appendix table 3 (cont'd)

Fork length (cm)	Haul no.																										
	1	2	3	4	6	7	8	11	12	16	17	19	20	21	22	23	24	25	26	27	28	29	36	38	39	40	41
51	-	-	0	-	0	0	-	0	0	0	-	0	0	0	1	-	0	-	-	-	-	-	-	-	-	-	0
52	-	-	0	-	0	0	-	0	1	0	-	1	0	0	0	-	0	-	-	-	-	-	-	-	-	1	0
53	-	-	0	-	0	1	-	0	-	0	-	-	0	0	0	-	0	-	-	-	-	-	-	-	-	-	0
54	-	-	1	-	0	0	-	1	-	0	-	-	0	0	0	-	0	-	-	-	-	-	-	-	-	-	0
55	-	-	1	-	0	0	-	0	-	0	-	-	1	0	0	-	0	-	-	-	-	-	-	-	-	-	0
56	-	-	0	-	0	1	-	0	-	0	-	-	0	0	0	-	0	-	-	-	-	-	-	-	-	-	0
57	-	-	0	-	0	0	-	0	-	0	-	-	0	0	0	-	0	-	-	-	-	-	-	-	-	-	0
58	-	-	0	-	0	0	-	1	-	0	-	-	0	0	0	-	0	-	-	-	-	-	-	-	-	-	0
59	-	-	0	-	0	0	-	0	-	0	-	-	1	0	1	-	2	-	-	-	-	-	-	-	-	-	1
60	-	-	0	-	0	1	-	1	-	0	-	-	-	1	-	-	0	-	-	-	-	-	-	-	-	-	-
61	-	-	0	-	0	0	-	0	-	0	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-
62	-	-	0	-	0	0	-	0	-	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
63	-	-	0	-	0	1	-	0	-	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
64	-	-	0	-	0	1	-	0	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
65	-	-	0	-	0	0	-	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
66	-	-	0	-	0	1	-	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
67	-	-	0	-	0	0	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
68	-	-	0	-	0	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
69	-	-	0	-	0	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
70	-	-	0	-	0	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
71	-	-	0	-	0	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
72	-	-	0	-	0	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
73	-	-	0	-	0	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
74	-	-	0	-	0	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
75	-	-	0	-	0	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
76	-	-	0	-	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
77	-	-	0	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
78	-	-	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
79	-	-	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
80	-	-	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
81	-	-	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
82	-	-	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
83	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total	1	23	10	3	2	11	1	6	6	5	9	2	6	5	12	12	7	1	1	1	1	3	159	115	4	1	6

Appendix table 4. Size composition (no. sampled), by haul, of walleye pollock sampled, during G.B. REED Groundfish Cruise No. 83-5, September 20-October 6, 1983.

Fork length (cm)	Haul no.																		
	1	2[a]	3	4	6	7[b]	8	11[c]	12	15	16	17	19	20	21	22	24	40	41
9	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-
10	1	-	-	-	-	-	-	-	-	0	-	-	-	-	-	-	-	-	-
11	43	-	-	1	-	-	-	-	-	0	-	-	-	-	-	-	-	-	-
12	68	-	-	3	-	-	-	-	-	2	4	2	-	-	1	-	-	-	-
13	36	-	-	1	-	2	-	1	-	4	8	35	-	-	0	-	-	-	-
14	6	-	-	0	-	0	-	2	-	3	21	39	-	-	0	1	-	-	-
15	0	-	-	0	-	4	-	1	-	1	13	21	-	-	2	0	-	-	-
16	0	-	-	0	-	0	-	0	-	-	4	1	-	-	3	0	-	-	-
17	0	-	-	0	-	0	-	0	-	-	1	0	-	-	1	1	-	-	-
18	0	-	-	0	-	0	-	0	-	-	0	0	-	-	3	2	2	-	-
19	1	1	-	0	-	0	-	0	-	-	0	0	1	-	7	2	0	-	-
20	0	0	-	0	-	1	-	0	-	-	1	0	0	4	6	4	2	-	2
21	0	4	-	2	-	2	-	0	-	-	0	0	0	7	8	6	3	-	1
22	0	17	-	12	-	7	-	4	-	-	0	0	0	17	10	40	11	-	2
23	0	31	1	18	-	14	-	13	-	-	0	4	5	46	28	64	31	1	18
24	0	48	2	22	-	32	-	35	1	-	1	6	19	92	18	87	58	3	62
25	0	52	7	33	-	71	-	47	1	-	0	20	26	95	8	50	46	5	73
26	0	56	15	32	-	74	-	58	0	-	1	38	46	68	0	14	26	3	75
27	0	52	18	29	-	55	-	55	1	-	3	32	68	27	0	2	7	6	41
28	0	38	10	35	-	43	-	46	1	-	0	38	60	7	1	-	4	4	15
29	1	11	12	11	-	8	-	33	3	-	0	32	29	-	-	-	-	4	4
30	-	2	1	3	-	5	1	17	0	-	1	8	15	-	-	-	-	2	1
31	-	2	1	3	-	2	0	4	0	-	-	1	3	-	-	-	-	-	2
32	-	-	0	-	-	-	0	2	3	-	-	1	1	-	-	-	-	-	-
33	-	-	0	-	-	-	2	-	1	-	-	0	-	-	-	-	-	-	-
34	-	-	1	-	-	-	1	-	1	-	-	0	-	-	-	-	-	-	-
35	-	-	0	-	-	-	2	-	2	-	-	1	-	-	-	-	-	-	-
36	-	-	1	-	-	-	1	-	2	-	-	1	-	-	-	-	-	-	-
37	-	-	1	-	-	-	0	-	4	-	-	-	-	-	-	-	-	-	-
38	-	-	0	-	-	-	0	-	4	-	-	-	-	-	-	-	-	-	-
39	-	-	1	-	-	-	0	-	4	-	-	-	-	-	-	-	-	-	-
40	-	-	-	-	-	-	1	-	4	-	-	-	-	-	-	-	-	-	-
41	-	-	-	-	1	-	2	-	1	-	-	-	-	-	-	-	-	-	-
42	-	-	-	-	1	-	0	-	3	-	-	-	-	-	-	-	-	-	-
43	-	-	-	-	0	-	1	-	5	-	-	-	-	-	-	-	-	-	-
44	-	-	-	-	0	-	0	-	1	-	-	-	-	-	-	-	-	-	-
45	-	-	-	-	0	-	0	-	0	-	-	-	-	-	-	-	-	-	-
46	-	-	-	-	0	-	0	-	0	-	-	-	-	-	-	-	-	-	-

Appendix table 4 (cont'd)

Fork length (cm)	Haul no.																		
	1	2[a]	3	4	6	7[b]	8	11[c]	12	15	16	17	19	20	21	22	24	40	41
47	-	-	-	-	0	-	0	-	0	-	-	-	-	-	-	-	-	-	-
48	-	-	-	-	0	-	0	-	0	-	-	-	-	-	-	-	-	-	-
49	-	-	-	-	0	-	0	-	0	-	-	-	-	-	-	-	-	-	-
50	-	-	-	-	0	-	0	-	0	-	-	-	-	-	-	-	-	-	-
51	-	-	-	-	0	-	0	-	1	-	-	-	-	-	-	-	-	-	-
52	-	-	-	-	0	-	0	-	1	-	-	-	-	-	-	-	-	-	-
53	-	-	-	-	0	-	0	-	0	-	-	-	-	-	-	-	-	-	-
54	-	-	-	-	1	-	0	-	0	-	-	-	-	-	-	-	-	-	-
55	-	-	-	-	0	-	0	-	0	-	-	-	-	-	-	-	-	-	-
56	-	-	-	-	0	-	0	-	1	-	-	-	-	-	-	-	-	-	-
57	-	-	-	-	1	-	0	-	-	-	-	-	-	-	-	-	-	-	-
58	-	-	-	-	0	-	0	-	-	-	-	-	-	-	-	-	-	-	-
59	-	-	-	-	0	-	0	-	-	-	-	-	-	-	-	-	-	-	-
60	-	-	-	-	0	-	1	-	-	-	-	-	-	-	-	-	-	-	-
61	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total	150	314	71	205	5	320	12	318	45	11	58	280	273	363	96	273	190	28	296

[a]Sampled 27% of catch by weight.

[b]Sampled 40% of catch by weight.

[c]Sampled 25% of catch by weight.

Appendix table 5. Size composition (no. sampled), by haul, of sablefish sampled, during G.B. REED Groundfish Cruise No. 83-5, September 20-October 6, 1983.

Fork length (cm)	Haul no.			
	11	16	17	18[a]
26	-	1	-	-
27	2	2	1	-
28	2	12	2	-
29	5	9	5	-
30	23	13	3	-
31	21	11	5	-
32	20	3	1	-
33	5	1	0	-
34	0	-	0	-
35	1	-	2	-
36	0	-	4	-
37	0	-	3	-
38	1	-	7	-
39	-	-	2	1
40	-	-	5	1
41	-	-	2	1
42	-	-	0	0
43	-	-	0	1
44	-	-	0	1
45	-	-	2	2
46	-	-	-	8
47	-	-	-	6
48	-	-	-	10
49	-	-	-	8
50	-	-	-	8
51	-	-	-	11
52	-	-	-	4
53	-	-	-	5
54	-	-	-	3
55	-	-	-	2
56	-	-	-	1
Total	80	52	44	73

[a]Sampled 36% of catch by weight.

Appendix table 6. Fork lengths (cm), by haul, of Pacific halibut caught during G.B. REED Groundfish Cruise No. 83-5, September 20-October 6, 1983.

Haul no.																	
1	2	3	4	5	6	7	8	11	15	16	17	18	19	21	22	23	29
46	58	54	55	51(2)[a]	50	49	87	56	40	64	60	65	66	68(2)	56	62(2)	63
54	94	59	59	52(2)	54	51			55			68	69	70	68(2)	64	93
61		60	66(2)	55	55	58			77			73			69	70	
63		65	75	56(4)	56(2)	80						74			88	71	
64(2)		69		57(3)	57(5)											72	
65				58(2)	58(6)											75	
66(2)				59	59(4)											77	
75				60	60(3)												
86				61(3)	61(7)												
				62(6)	62(6)												
				63(5)	63(5)												
				64(8)	64(9)												
				65(5)	65(9)												
				66(7)	66(9)												
				67(3)	67(13)												
				68(2)	68(5)												
				70(1)	69(14)												
				71(2)	70(8)												
				73	71(5)												
				74	72(6)												
					73(2)												
					74(5)												
					75(2)												
					76(5)												
					77(3)												
					78(2)												
					79(2)												
					81(2)												
					82(2)												
					84												
					86												
Totals:																	
11	2	5	5	60	146	4	1	1	3	1	1	4	2	3	5	8	2

[a]Nos. sampled, if more than one, in parentheses.

Appendix table 7. Size composition (no. sampled), by sex, by haul, of Dover sole, English sole, and rock sole sampled, during G.B. REED Groundfish Cruise No. 83-5, September 20-October 6, 1983.

Fork length (cm)	Dover sole	English sole								Rock sole				
	Haul no.	Haul no.								Haul no.				
	12	1		2		3		4		7	14	15	38	39
	U	M	F	M	F	M	F	M	F	U	U	U	U	U
7	-	-	-	-	-	-	-	-	-	-	-	-	4	-
8	-	-	-	-	-	-	-	-	-	-	-	-	15	7
9	-	-	-	-	-	-	-	-	-	-	-	-	26	21
10	-	-	-	-	-	-	-	-	-	-	-	-	98	2
11	-	-	-	-	-	-	-	-	-	-	-	-	106	7
12	-	-	-	-	-	-	-	1	-	-	-	-	41	5
13	-	-	-	-	-	-	-	2	-	-	1	-	11	37
14	-	-	-	-	-	-	-	0	-	-	0	-	52	37
15	-	-	-	-	-	-	-	0	-	-	2	1	61	18
16	-	-	-	-	-	-	-	0	-	-	4	2	56	17
17	-	-	-	-	-	-	-	0	-	-	1	2	70	31
18	-	-	-	-	-	-	-	0	-	-	1	1	61	30
19	-	1	-	-	-	-	-	0	-	-	2	7	54	36
20	-	0	-	-	-	-	-	0	-	-	2	2	43	26
21	-	0	-	-	-	-	-	0	-	-	2	1	20	14
22	-	1	-	-	-	-	-	1	-	-	0	2	50	13
23	-	1	-	1	-	2	-	1	-	-	2	2	39	6
24	-	0	-	1	-	0	-	0	-	-	2	0	20	9
25	2	0	-	0	1	2	-	0	-	-	0	2	19	3
26	1	0	-	0	0	3	-	0	-	-	1	1	6	5
27	0	0	1	1	0	2	-	2	-	-	0	2	9	4
28	0	0	0	0	4	3	-	4	-	1	1	0	10	4
29	0	2	2	2	3	2	1	1	-	0	1	1	15	5
30	9	-	1	1	6	1	5	0	-	0	0	0	11	9
31	14	-	1	5	3	2	4	0	-	0	0	0	7	11
32	16	-	0	3	4	2	9	0	3	3	1	2	11	9
33	9	-	2	1	11	2	7	1	2	1	3	1	17	4
34	13	-	0	1	6	0	5	0	2	6	1	2	21	5
35	21	-	2	-	7	1	9	0	6	5	2	0	32	4
36	11	-	1	-	6	-	8	0	1	9	2	2	29	6
37	4	-	-	-	4	-	7	1	5	7	1	0	13	6
38	5	-	-	-	3	-	7	-	2	7	5	1	11	1
39	3	-	-	-	1	-	4	-	3	4	2	1	11	2
40	3	-	-	-	1	-	2	-	1	4	1	1	3	1
41	1	-	-	-	0	-	3	-	0	3	1	3	8	3
42	1	-	-	-	0	-	3	-	1	2	1	2	8	1
43	2	-	-	-	1	-	0	-	-	0	2	0	7	1
44	1	-	-	-	0	-	1	-	-	0	1	0	7	0

Appendix table 7 (cont'd)

Fork length (cm)	Dover sole	English sole								Rock sole				
	Haul no.	Haul no.								Haul no.				
	12	1		2		3		4		7	14	15	38	39
	U	M	F	M	F	M	F	M	F	U	U	U	U	U
45	0	-	-	-	0	-	0	-	-	2	2	1	5	1
46	0	-	-	-	0	-	0	-	-	1	0	-	2	0
47	0	-	-	-	0	-	0	-	-	0	1	-	1	0
48	0	-	-	-	1	-	1	-	-	2	-	-	0	1
49	0	-	-	-	1	-	1	-	-	0	-	-	1	-
50	0	-	-	-	1	-	1	-	-	1	-	-	-	-
51	0	-	-	-	-	-	-	-	-	1	-	-	-	-
52	2	-	-	-	-	-	-	-	-	-	-	-	-	-
53	1	-	-	-	-	-	-	-	-	-	-	-	-	-
Total	119	5	10	16	64	22	78	14	26	59	48	42	1091	402

Appendix table 8. Size composition (no. sampled), by haul, of shiner perch and Pacific ocean perch sampled during G.B. REED Groundfish Cruise No. 83-5, September 6-October 6, 1983.

Shiner perch		Pacific ocean perch		
Fork length (cm)	Haul no.	Fork length (cm)	Haul no.	
	38		40	41
7.5	1	9	-	2
8.0	0	10	2	9
8.5	0	11	12	29
9.0	1	12	23	19
9.5	1	13	17	3
10.0	1	14	3	-
10.5	25	15	1	-
11.0	64	16	6	-
11.5	66	17	15	-
12.0	63	18	22	-
12.5	80	19	16	-
13.0	72	20	4	-
13.5	63	21	7	-
14.0	46	22	4	-
14.5	23	23	2	-
15.0	14	24	2	-
15.5	14	25	3	-
16.0	15	26	1	-
16.5	5	27	1	-
17.0	3			
17.5	1			
Total	558		141	62

Appendix table 9. Length-weight relationships, by sex, for English sole collected in Hecate Strait during G.B. REED Groundfish Cruise No. 83-5, September 20-October 6, 1983.

Fork length (cm)	Males		Females	
	$\bar{W}^a$	N	$\bar{W}^a$	N
25	125	10	134	3
30	233	14	242	10
34	-	-	397	10
35	342	3	421	20
36	-	-	468	10
37	-	-	506	20
38	384	2	543	10
39	-	-	612	10
40	-	-	634	10
41	-	-	694	10
42	-	-	700	7
43	-	-	783	8
44	-	-	835	5
45	-	-	856	3
46	-	-	913	3
47	-	-	1098	2
48	-	-	953	1
49	-	-	1213	2
Total		29		144

[a]Mean weight in grams.

Appendix table 10. Corner locations for echo-sounder track lines completed on Goose Island Bank during G.B. REED Groundfish Cruise No. 83-5, September 20-October 6, 1983.

Stn	Time (PDT)	Date	Depth (fath)	Dir (°T)	LORAN C		N. lat.		W. long.	
					X	Z	°	'	°	'
AA	2210	21	37	114	13300	41350	51	49.9	128	49.5
BB	0040	22	81	210	13460	41350	51	43.1	128	26.1
CC	0055	22	81	295	13460	41340	51	41.9	128	27.4
DD	0355	22	31	212	13360	41340	51	48.0	128	51.0
EE	0427	22	33	110	13300	41320	51	45.5	128	54.5
FF	0706	22	76	210	13460	41320	51	39.1	128	29.6
GG	0736	22	81	291	13460	41300	51	36.4	128	32.6
HH	1017	22	37	212	13300	41300	51	43.6	128	54.2
II	1101	22	28	110	13300	41280	51	39.3	129	00.6
JJ	1356	22	95	210	13480	41280	51	33.1	128	31.7
KK	1434	22	103	288	13480	41260	51	30.1	128	34.5
LL	1744	22	25	212	13300	41260	51	36.0	129	03.7
MM	1817	22	26	110	13300	41240	51	32.7	129	07.0
NN	2152	22	114	210	13480	41240	51	27.1	128	36.8
OO	2230	22	118	285	13480	41220	51	23.9	128	39.9
PP	0225	23	28	280	13300	41220	51	29.0	129	11.0
QQ	0640	23	106	035	13080	41220	51	34.8	129	50.8
RR	0739	23	104	103	13080	41240	51	38.7	129	46.0
MM	1203	23	27	032	13300	41240	51	32.7	129	06.9
LL	1238	23	26	288	13300	41260	51	36.3	129	03.6
SS	1713	23	156	035	13080	41260	51	42.4	129	41.7
TT	1805	23	148	108	13080	41280	51	46.6	129	37.0
II	2208	23	29	032	13300	41280	51	39.6	129	00.0
HH	2242	23	36	289	13300	41300	51	42.7	128	57.0
UU	0210	24	119	035	13120	41300	51	49.5	129	25.6
VV	0240	24	123	111	13120	41320	51	52.5	129	22.3
EE	0550	24	34	032	13300	41320	51	45.8	128	53.7
DD	0623	24	35	293	13300	41340	51	48.8	128	51.0
WW	0912	24	101	035	13140	41340	51	55.0	129	15.7
XX	0931	24	103	125	13140	41350	51	56.6	129	13.8
AA	1213	24	39	-	13300	41350	51	50.0	128	49.0
TT'	0617	5	152	107	13080	41273	51	45.2	129	38.9
II'	0849	5	26	211	13300	41273	51	38.0	129	01.5
LL'	0905	5	30	275	13300	41267	51	37.0	129	02.5
SS'	1255	5	152	-	13080	41267	51	44.3	129	40.3

Appendix table 11. Locations of "untrawlable" bottom along echo-sounder tracklines on Goose Island Bank, occupied during G.B. REED Groundfish Cruise No. 83-5, September 20-October 6, 1983.

Line	"Untrawlable"
AA-BB	X-13300-308; 392-432
BB-CC	-
CC-DD	X-13436-424
DD-EE	Z-41336-320
EE-FF	X-13300-314; 324-334; 336-350; 406-420
FF-GG	Z-41314-308
GG-HH	X-13440-354; 318-300
HH-II	Z-41300-326
II-JJ	X-13300-480
JJ-KK	Z-41270-262
KK-LL	Z-13442-300
LL-MM	Z-41260-250
MM-NN	X-1330-426; 434-444
NN-OO	-
OO-PP	X-13358-348; 321-300
PP-QQ	X-13300-080
QQ-RR	Z-41220-240
RR-MM	X-13084-300
MM-LL	Z-41240-260
LL-SS	X-13300-080
SS-TT	-
TT-II	X-13130-142
II-HH	Z-41294-300
HH-UU	X-13300-274; 164-134
UU-VV	-
VV-EE	X-13144-156; 260-300
EE-DD	Z-41320-340
DD-WW	X-13282-170; 176-120
WW-XX	Z-41340-350
XX-AA	X-13140-300
TT'-II'	X-13102-140; 282-300
II'-LL'	Z-41273-267
LL'-SS'	X-13300-240; 224-204; 164-120

Appendix table 12. Temperatures (°C) determined from expendable bathythermograph readings taken at designated oceanographic stations during G.B. REED Groundfish Cruise No. 83-5, September 20-October 6, 1983.

Station/ haul no.	Day/ month	Time (PDT)	N. lat. ° '	W. long. ° '	Standard depths (m) 0	10	20	30	50	75	100	125	150	200	250	300	Bottom °C	Bottom Depth (m)
1	21/9	0641	51 07.0	128 20.0	10.9	10.9	10.8	10.8	10.3	9.3	8.1	7.7	-	-	-	-	7.4	130
5	21/9	0845	51 24.0	128 42.5	13.0	12.3	13.3	12.5	10.8	9.3	8.4	8.2	7.5	7.0	-	-	7.0	215
8	21/9	1245	51 06.8	129 37.2	13.7	13.7	13.4	12.7	10.0	13.6	7.7	7.7	7.7	7.0	6.6	6.5	5.6	390
10	21/9	1610	51 36.0	130 02.5	13.5	13.5	13.6	12.6	9.4	7.8	7.8	7.3	7.1	6.7	6.5	6.8	5.5	335
13	21/9	1935	52 00.0	129 30.0	13.3	13.3	13.0	11.9	9.3	8.4	7.6	7.2	6.7	-	-	-	6.7	196
13	24/9	1525	52 00.0	129 30.0	13.5	13.5	13.5	12.3	10.2	8.8	8.2	7.3	6.8	6.7	-	-	6.7	206
15	24/9	1950	52 00.0	130 31.0	13.2	13.2	13.2	12.2	9.1	8.2	7.8	7.7	7.3	6.8	6.7	5.9	5.8	388
21	25/9	0150	53 00.0	130 12.5	13.3	13.3	13.3	12.0	10.6	9.5	7.8	7.2	6.8	-	-	-	5.8	196
24	25/9	0540	53 28.5	130 47.0	13.2	12.7	12.7	12.7	11.3	9.2	8.0	7.8	6.9	-	-	-	6.9	161
28A	25/9	1002	54 08.5	131 03.3	12.8	12.8	12.8	12.8	11.5	9.5	8.3	-	-	-	-	-	8.1	104
33	26/9	0915	54 24.5	131 23.0	12.2	12.1	11.6	11.4	10.7	9.7	8.1	7.5	6.7	-	-	-	6.3	175
Haul 36	3/10	1519	52 58.7	130 41.0	12.7	12.6	12.5	12.5	10.4	8.8	8.5	-	-	-	-	-	8.5	102
24	4/10	1203	53 28.5	130 47.0	12.3	12.1	12.1	12.1	11.4	9.5	8.3	7.6	7.1	-	-	-	6.7	156
21	4/10	1848	53 00.0	130 12.5	12.2	12.2	12.3	12.4	11.0	9.5	8.1	7.6	6.9	6.2	-	-	6.0	223
15	5/10	0025	52 00.0	130 31.0	12.7	12.7	12.7	10.3	9.6	8.5	7.9	7.9	7.6	7.0	6.5	6.3	6.0	419
13	5/10	0352	52 00.0	129 30.0	12.5	12.4	12.4	12.4	9.8	8.6	7.8	7.1	6.7	6.4	-	-	6.4	202
10	5/10	1620	51 36.0	130 02.5	12.9	12.8	12.8	11.8	9.8	8.7	7.8	6.9	6.8	6.8	6.4	6.1	5.9	344
5	5/10	2110	51 24.0	128 42.5	12.9	12.8	12.5	12.3	10.5	8.7	7.8	7.4	7.3	7.0	-	-	6.9	221
1	5/10	2308	51 07.0	128 20.0	10.7	10.7	10.7	10.6	10.1	9.2	7.8	7.5	7.2	-	-	-	7.2	186

Appendix table 13. Locations and contents of Shipek bottom grabs completed in Hecate Strait during G.B. REED Groundfish Cruise No. 83-5, September 20-October 6, 1983.

Area	Sample no.	N. lat. ° '	W. long. ° '	Depth (fath)	Depth (m)	Contents of grab[a]
Dundas						
	1	54 25.0	131 12.9	72	132	shS
	2	54 24.9	131 10.7	59	108	shS
	3	54 25.0	131 07.1	70	128	sM
	4	54 25.1	131 05.4	68	124	gS
	5	54 25.1	131 04.0	60	110	gS
	6	54 25.2	131 02.9	50	91	shS
	7	54 26.1	131 03.3	60	110	shS
	8	54 26.3	131 06.3	79	145	S
	9	54 26.2	131 10.9	81	148	S
Horseshoe						
	10	52 57.0	130 39.4	38	70	S
	11	52 57.4	130 38.8	40	73	gshS
	12	52 57.7	130 38.0	49	90	gshS
	13	52 57.9	130 37.6	64	117	gshS
	14	52 58.7	130 36.7	66	121	M
	15	52 59.5	130 35.4	52	95	mshS
	16	53 00.0	130 34.9	50	91	gshmS
	17	53 00.3	130 34.3	50	91	sshG
	18	53 01.0	130 32.9	50	91	gS
	19	53 01.4	130 32.2	61	112	S

[a]Meaning of abbreviations:

G = gravel	g = gravelly
M = mud	m = muddy
S = sand	s = sandy
Sh = shell	sh = shelly

Appendix table 14. Catch (kg) of invertebrates, by category, by haul, during G.B. REED Groundfish Cruise No. 83-5, September 20-October 6, 1983.

Category	Total catch (kg)	Haul no. (catch[a]-kg)
Anemone	64	10, 11(7), 12(3), 14(14), 16(2), 29(5), 31, 32(2), 35, 39(31)
Basketstar	25	19, 21(1), 22(14), 23(1), 24(4), 26(1), 27, 41(4)
Brittlestar	545	1(62), 2(167), 3(174), 4, 5(16), 6(100), 19, 39(22), 40(4)
Cockle	Tr[b]	11
Crab	18	1, 9, 11, 16(2), 31, 34, 35, 36, 37(1), 38(15)
Cucumber	213	10, 14(54), 15(6), 29, 32, 38(7), 39(136), 40(10)
Nudibranch	Tr	34
Octopus	Tr	20, 22, 40
Oregon triton	6	10, 12(6)
Prawn	Tr	12, 16, 17, 34
Scallops	6	14, 15, 19, 20, 21, 23, 25, 26, 33, 36, 37(1), 38, 39(5), 40
Shrimp	45	1, 8, 12, 14, 24(21), 31, 40, 41(24)
Squid	1	1, 14, 15, 19, 26, 29(1), 33, 34, 35, 39, 41
Starfish	186	2(9), 3(10), 4(4), 7(1), 11(43), 12(19), 13, 14(14), 16(2), 25(2), 26, 28(1), 29, 31(2), 32(6), 33(1), 34, 35(8), 36(1), 37(8), 38(41), 39(9), 40(5)
Urchin	7	4, 9, 14, 25, 32, 39(5), 40(2), 41

[a]Catch in parentheses, follows haul no. if catch was more than a trace.

[b]Tr = trace (<0.5 kg).

POOR

QUALITY

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